

Interpretation guide for Encore software compliance reports

BiPAP AVAPS - BiPAP S/T
BiPAP A30 - BiPAP A40

Allies
in Better Sleep
and Breathing

PHILIPS
RESPIRONICS

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Ventilation:

Commitment to compliance

Our goal is to provide the best treatment solutions for your patients thanks to an advanced technology that is easy to use and helps customize follow-up.

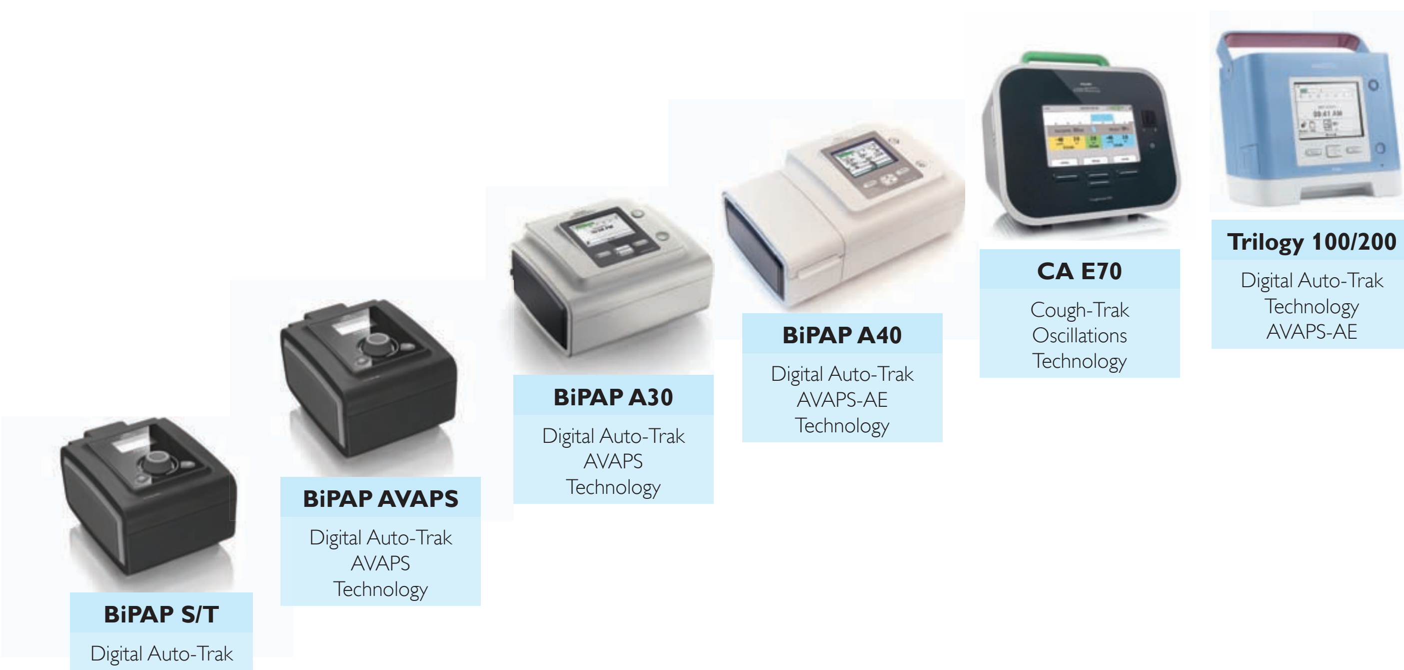
Clinically validated treatment solutions

The Philips Commitment to Compliance Philips Home Healthcare Solutions

-- Severe / Dependant ++

NMD, ALS, Pediatric (day and night)

Overlap, COPD, OHS (night)



* not available in all countries

EncorePro and EncoreAnywhere

DirectView

Oximetry

Our Auto-Trak and AVAPS technologies, clinically validated for several years, are in most of our ventilation devices. Their purpose is to support the quality and comfort of ventilation, in order to ensure patient compliance.

This is our commitment to compliance.

Validated:

Digital Auto-Trak and AVAPS

Digital Auto-Trak

The estimation of unintentional leaks is of major importance when monitoring NIV[1]; this also involves optimal synchronization of the patient-machine interface.[2] It is with this commitment to quality that Digital Auto-Trak meets these criteria:

- Simplified settings, since there are no trigger settings
- Mechanical ventilation synchronized with the patient and not affected by leaks
- Clinically validated algorithm
- Effective ventilation:
  - A precise estimate of leaks and of Vte at +/- 15%
  - Compensation of leaks above 60 LPM
- Digital Auto-Trak is available on all machines in the Philips non-invasive ventilation range

Digital Auto-Trak

AVAPS: Average Volume Assured Pressure Support*

It has been demonstrated during Bi-level ventilation with a leaking mask that by providing a target volume, it is possible to improve the quality of ventilation.[3,4]

This is the reason for the AVAPS function, which adjusts assisted pressure automatically depending on the needs of patients.

- Facilitates titration: no adjustment of IPAP
- Tracks the progression of the disease and the changing ventilation needs of patients
- Improves ventilation: efficacy and comfort
- Increased safety: guaranteed average volume, alarms for Vte and minute ventilation

AVAPS

New AVAPS*-AE ventilation mode

This new mode combines the efficacy of the AVAPS function with

- Adjustment of expiratory pressure based on an algorithm for measuring the resistances of upper airways.
- Automatic setting of the target respiratory frequency night after night.

The purpose of this mode is to ensure effective and comfortable ventilation for the patient.

AVAPS-AE

Reason:

- **29% to 40% of COPD patients have an OSA**[5]
- **90% of those with OHS have an OSA**[6]

* AVAPS: Average Volume Assured Pressure Support mode

1 Contal, Chest, 2011: "Monitoring of NIV by built-in software of home bilevel ventilators: a bench study"

2 Battisti, Chest, 2005: "Performance Characteristics of 10 Home Mechanical Ventilators in Pressure-Support Mode"

3 Murphy, Thorax, 2012: "Volume targeted versus pressure support non-invasive ventilation in patients with super obesity and chronic respiratory failure: a randomised controlled trial"

4 Storre et al. Chest 2006; 130: 815-821

5 Jelic International Journal of COPD 2008: 3(2)269-275

6 Mohklesi. Chest 2007:131;1624-1626

Definitions

Definitions of detected events

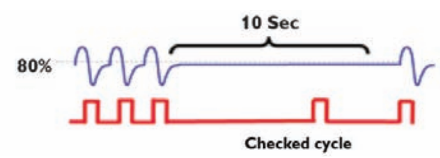
Understanding how the machine functions

Advanced detection of events

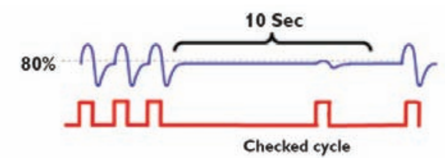
Nocturnal breathing disorders, such as apneas, hypopneas, RERA, snoring and Cheyne-Stokes respiration, are detected depending on the devices. Devices can also distinguish between open or closed airway sleep apneas.

Apnea (OSA or CSA): Absence or reduction by at least 80% of patient air flow for at least 10 seconds. When the machine detects an event, it tests the patient's airway during the tested breathing cycle:

1. If no air flow is generated by the ventilation: the airways are obstructed
2. If air flow is generated by the ventilation: the airways are open

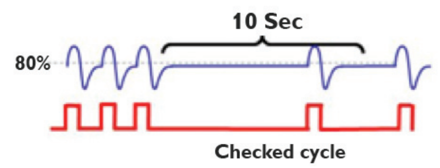


Obstructed airway apnea



Open airway apnea

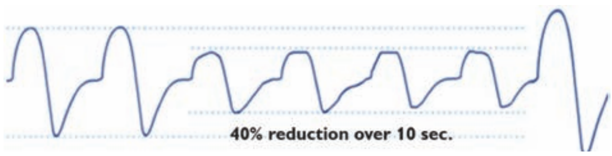
If the test cycle leads to a flow greater than 80%, the apnea has been effectively treated, and no event is reported.



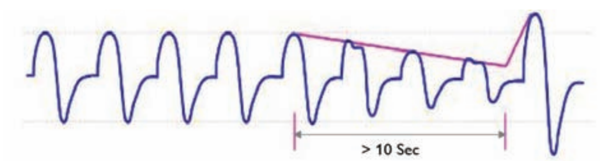
The machine can test the airways several times during apnea until the patient starts breathing again spontaneously.
In the case of mixed apnea (started by a central apnea, then finishing with efforts again), the apnea will be qualified as OSA (Obstructive Sleep Apnea).

Comment:
In Spontaneous mode or PPC, detection of events is the same as that for sleep therapy devices.

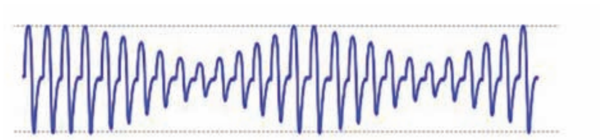
Hypopnea (H): Defined by a 40% reduction in airflow for at least 10 seconds.



RERA: (Respiratory Effort Related Arousal)
A sequence of breaths that exhibit both a subtle reduction in airflow during a 10-second period and a progressive increase in flow limitation. If a breath sequence is terminated by a sudden increase in airflow (along with elimination of flow limitation), a RERA is indicated.



Cheyne-Stokes Respiration (CSR): Period lasting 30 to 100 seconds of successive hypoventilation and hyperventilation cycles that repeat. The reduction of air flow during hypoventilation must be at least 40%, and this event must last several minutes before being qualified as periodic respiration.



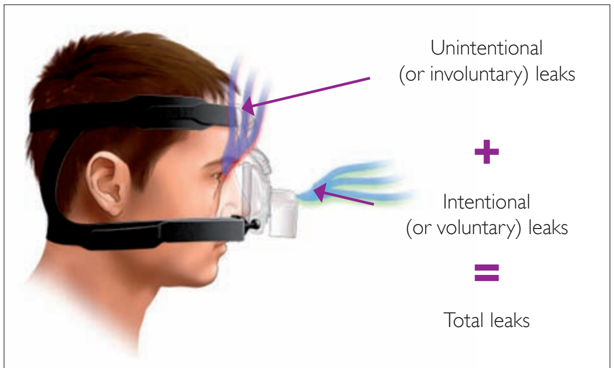
Vibratory Snoring (VS): Pressure sensor identifies pressure fluctuations that occur in airway during inspiration.



How to read and interpret leak information

It is essential to detect and resolve unintentional leaks caused by a poor mask seal or mouth leak. These leaks, if large and regular, can affect treatment efficacy and lead to significant discomfort for the patient.

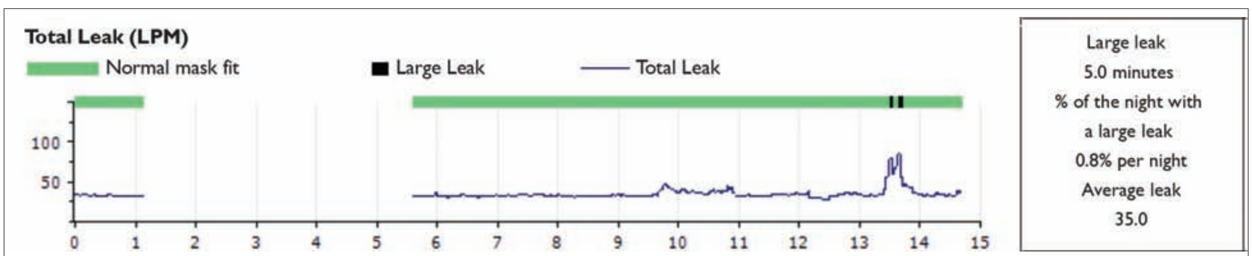
Definition of leaks:

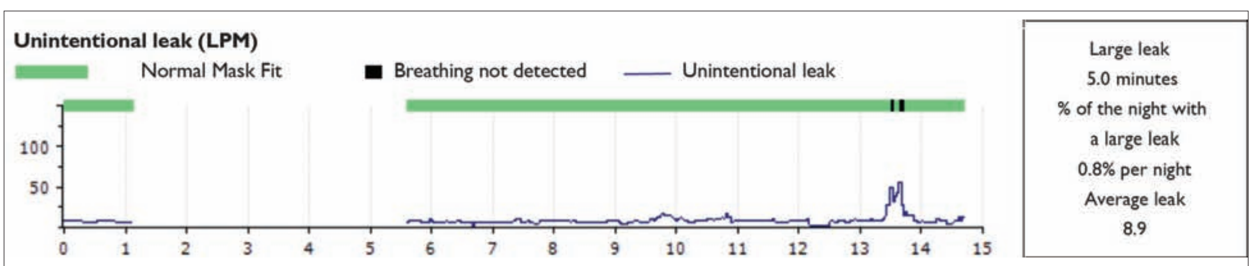


Intentional leaks: leaks caused by the mask exhalation port. Intentional leaks vary according to the level of pressure applied.
Unintentional leaks: leaks around the mask resulting from a poor mask seal or mouth leak due to the patient's mouth opening while sleeping.
Total leaks: intentional leaks + unintentional leaks. Leaks are expressed in litres/minute.

Data available on leaks

Display of total leaks/unintentional leaks
The Encore software (Entity parameter tab/parameter worksheet) allows you to choose between displaying total leaks or unintentional leaks, excluding intentional mask leaks for each pressure point. The unintentional leak display allows for fast identification of a problem with mask seal or mouth leak.





Large leak alert during the night

This algorithm was developed to tolerate leaks and to compensate for them up to a certain level. Beyond that level, the analysis of the respiration may no longer be accurate and that is why the algorithm indicates the area of large leaks. These periods are indicated by black or light green bars depending on the machine model and version of the Encore software.

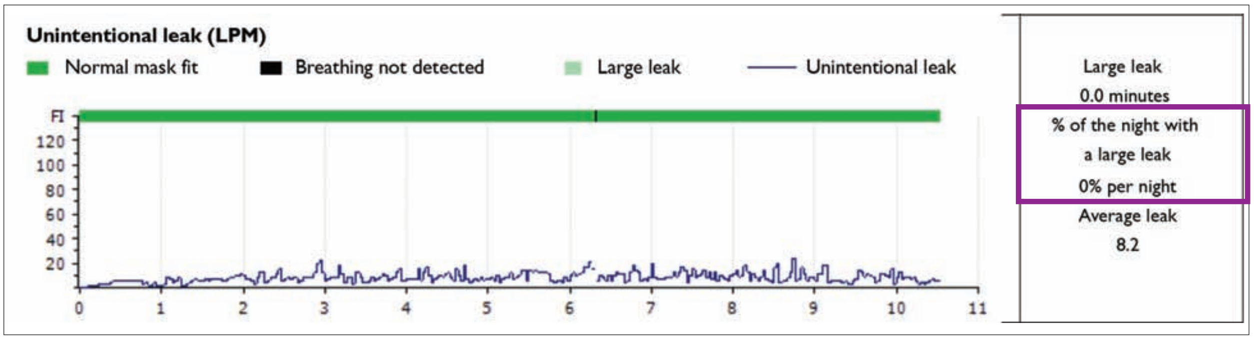
The percentage of the night spent with large leaks is indicated in the reports.

Note

It is recommended to resolve the problem of mask leaks if there are more than 5% of large leaks during the night. Interpretation of the report should take into consideration that the patient is not being treated properly by the machine during these periods of large leaks.

Detecting mouthpiece leaks

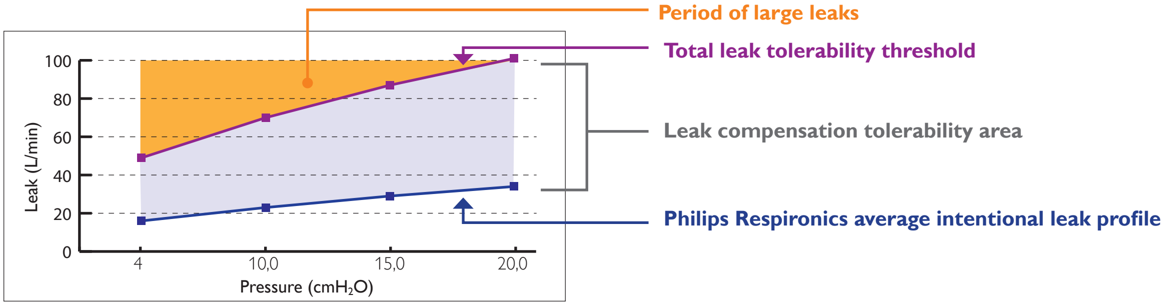
There is a suspicion of mouthpiece leaks when the unintentional (or unplanned) leak profile is shaded and unstable and when there are no large leaks, as below.



Machine management of leaks: Digital Auto-Trak

Philips Respironics machines use an advanced algorithm regarding leak tolerability and compensation: Digital Auto-Trak.[1] This technology allows, at all times, for the machine to save a reliable and precise reading of patient air flow, for unintentional and variable air flow during the night. This guarantees delivery of the set pressures and AVAPS by the machine, as well as the efficacy of detection algorithms for respiratory events.

Philips Respironics machines tolerate up to 2 times the intentional leaks. They compensate for these leaks by adjusting the blower speed. Beyond the level of tolerability, the machine indicates that its detection is no longer reliable because of the high level unintentional leaks (= period of large leaks). During periods of large leaks, ventilation is ensured thanks to the back-up rate.



1 Contal, Chest, 2011: "Monitoring of NI V by built-in software of home bilevel ventilators: a bench study"

The ventilation modes

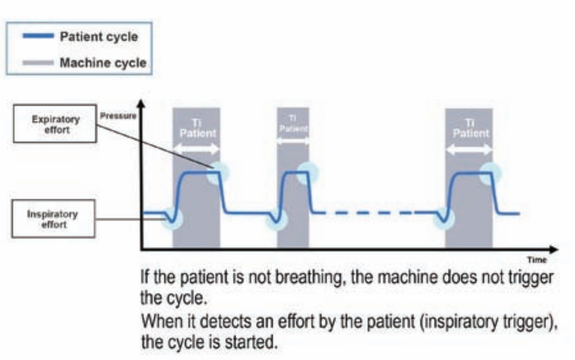
In BiPAP S/T, BiPAP AVAPS, BiPAP A30 and BiPAP A40, pressure ventilation modes are used.

What differentiates these modes is the autonomy given to the patient on whether or not to trigger the respiratory cycles or stop them.

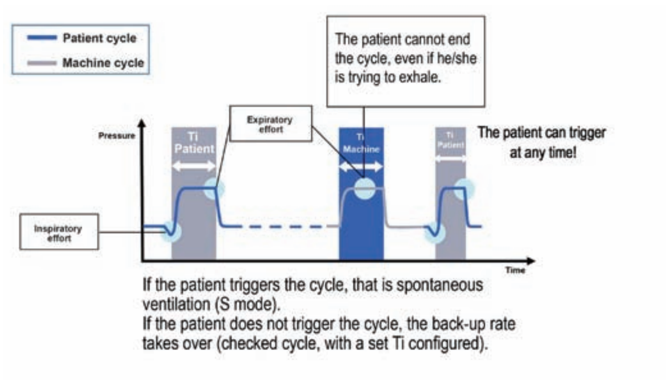
Pressure modes:

S:	Spontaneous: the respiration cycles are triggered and checked by the patient.
S/T:	Spontaneous/Timed: similar to the spontaneous mode, with the ability for cycles triggered and controlled by the unit, starting from a defined rate and inspiratory time
PC:	Pressure Control: the breaths are triggered by the patient or by the device, and controlled by the device. The length of the breath is determined by the inspiratory time setting.
T:	Timed: the respiration cycles are triggered and controlled by the device, breathing rate of the patient has no effect on the device's breath rate.
AVAPS-AE:	AVAPS-AE breaths can be triggered and controlled by the patient, with the ability for breaths to be triggered and controlled by the device from a breath rate and inspiratory time defined automatically by the unit.

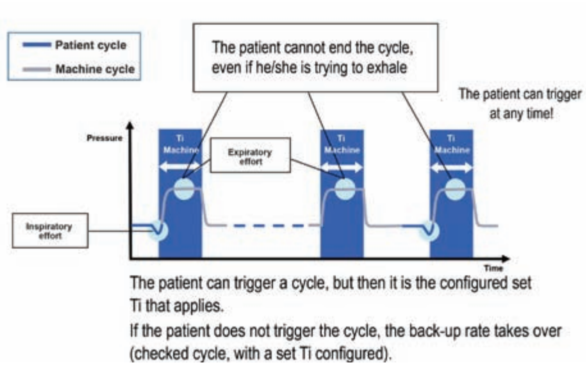
S mode:



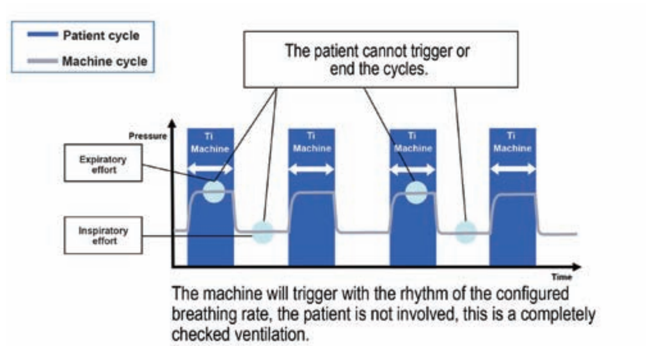
S/T mode:



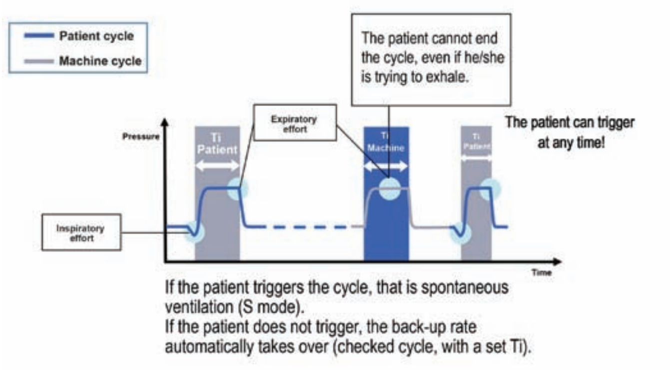
PC mode:



T mode:



AVAPS-AE mode:



The AVAPS-AE mode is the only mode combining a guaranteed tidal volume, a variation of exhalation pressure to overcome the resistance of the upper airways, and a back-up rate calculated from the patient's breathing.

Conversion tables:

Conversion table to set the inspiratory time for controlled breaths

Set back-up rate (BPM)	I/E 1/3, Ti/Ttot 25%	I/E 1/2 Ti/Ttot 33%	I/E 1/1 Ti/Ttot 50%
10	1.5 sec.	2.0 sec.	3.0 sec.
11	1.4 sec.	1.8 sec.	2.7 sec.
12	1.3 sec.	1.7 sec.	2.5 sec.
13	1.2 sec.	1.5 sec.	2.3 sec.
14	1.1 sec.	1.4 sec.	2.1 sec.
15	1.0 sec.	1.3 sec.	2.0 sec.
16	0.9 sec.	1.3 sec.	1.8 sec.
17	0.9 sec.	1.2 sec.	1.7 sec.
18	0.8 sec.	1.1 sec.	1.6 sec.
19	0.8 sec.	1.1 sec.	1.5 sec.
20	0.8 sec.	1.0 sec.	1.5 sec.
21	0.7 sec.	1.0 sec.	1.4 sec.
22	0.7 sec.	0.9 sec.	1.3 sec.
23	0.7 sec.	0.9 sec.	1.3 sec.
24	0.6 sec.	0.8 sec.	1.2 sec.
25	0.6 sec.	0.8 sec.	1.2 sec.

Set the inspiratory time in seconds: Ti (sec) = 60/breathing rate x % Ti

Conversion tables: (cont.)

Conversion table to set the target tidal volume in relation to the ideal weight

Height	Calculated ideal weight (when BMI = 23)	Target Vte if 8 ml/kg	Target Vte if 10 ml/kg
1.50 m	52.0 kg	410 mL	520 mL
1.55 m	55.0 kg	440 mL	550 mL
1.60 m	59.0 kg	470 mL	590 mL
1.65 m	62.5 kg	500 mL	620 mL
1.70 m	66.5 kg	530 mL	660 mL
1.75 m	70.5 kg	560 mL	700 mL
1.80 m	74.5 kg	600 mL	740 mL
1.85 m	78.5 kg	630 mL	780 mL
1.90 m	83.0 kg	660 mL	830 mL

Calculated with an ideal body mass index of 23 kg/m^2 (BMI = $weight/height^2$)

Data reading methodology

1. Compliance:

a. Is overall compliance satisfactory?

b. What is the ratio between the number of therapy hours versus the number of patient sleep hours?

c. What does the usage profile teach us? Is compliance continuous and regular? Is there napping?

2. Leaks:

a. Is the average % of the night spent with large leaks higher than 5%? Every night?

b. Are mouth leaks suspected?

3. Volume:

a. Is it normal?

b. If the AVAPS is activated, is the average tidal volume close to the set target volume?

c. What is the stability at this volume?

d. How has the tidal volume been set? 8 to 10 mL/kg, depending on the height and the theoretical weight of the patient.

4. Pressures:

a. Are they equal to the prescribed pressures?

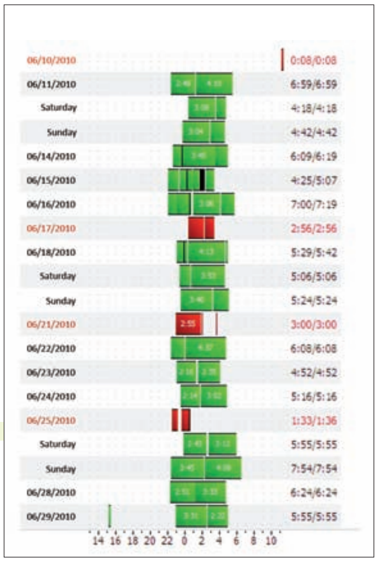
b. If the AVAPS is activated, does the average inspiratory pressure vary between the IPAP min and max?

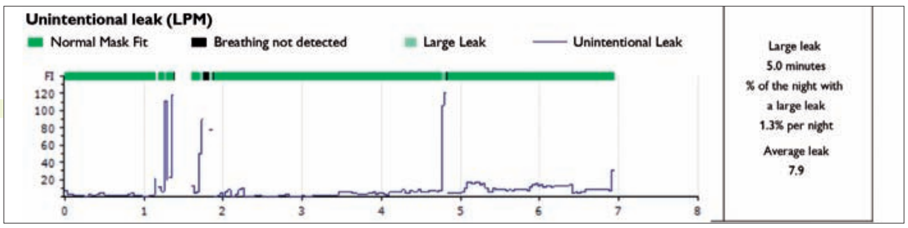
c. Is this the same for the average expiratory pressure in the AVAPS-AE mode?

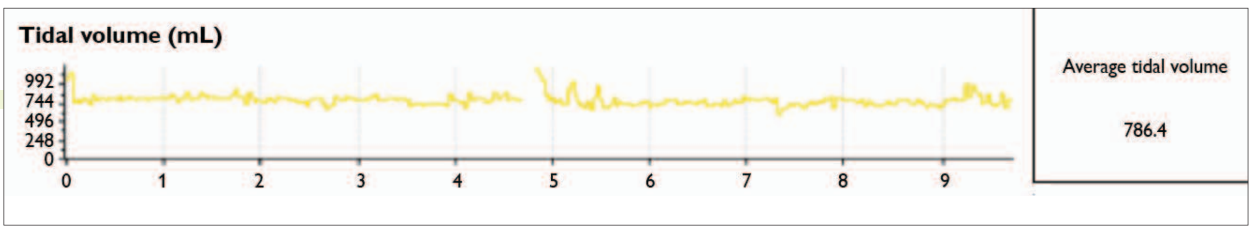
5. Ventilation-minutes:

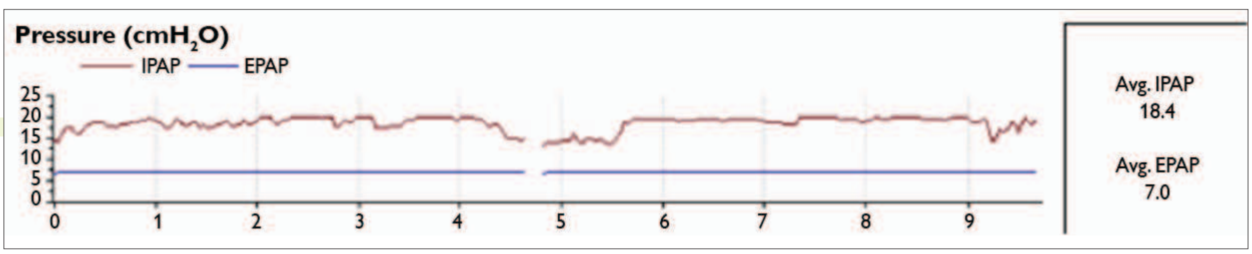
a. Are they normal?

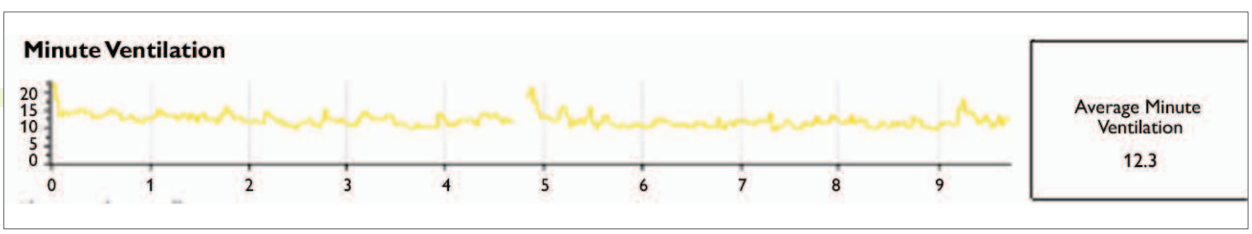
b. Do they correspond to the patient's needs (adjusted volume and frequency)?


06/10/2010 0:08/0:08
06/11/2010 6:59/6:59
Saturday 4:18/4:18
Sunday 4:42/4:42
06/14/2010 6:09/6:19
06/15/2010 4:25/5:07
06/16/2010 7:00/7:19
06/17/2010 2:56/2:56
06/18/2010 5:29/5:42
Saturday 5:06/5:06
Sunday 5:24/5:24
06/21/2010 3:00/3:00
06/22/2010 6:08/6:08
06/23/2010 4:52/4:52
06/24/2010 5:16/5:16
06/25/2010 1:33/1:36
Saturday 5:55/5:55
Sunday 7:54/7:54
06/28/2010 6:24/6:24
06/29/2010 5:55/5:55
14 16 18 20 22 0 2 4 6 8 10

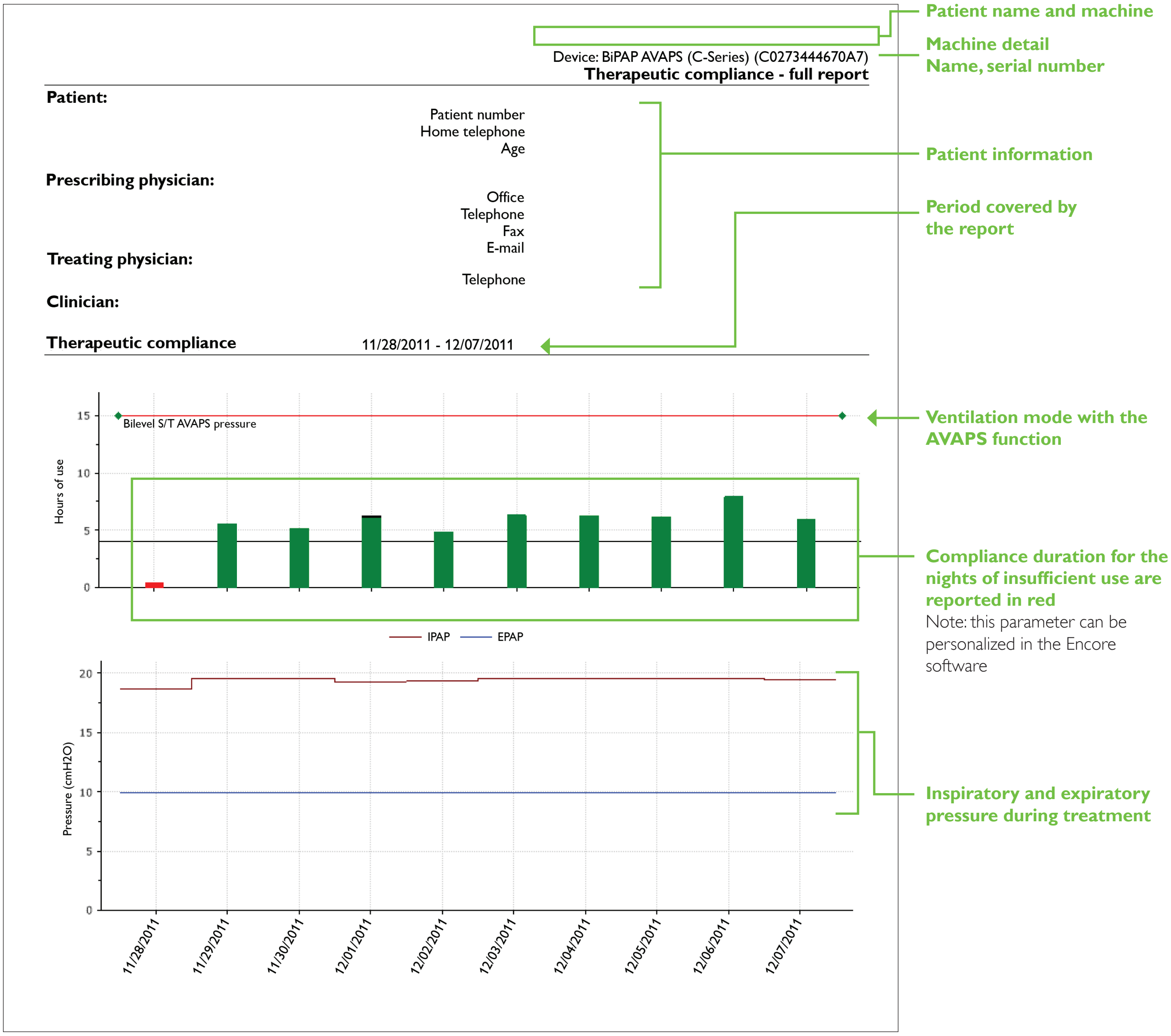

Unintentional leak (LPM)
Normal Mask Fit
Breathing not detected
Large Leak
Unintentional Leak
Large leak
5.0 minutes
% of the night with
a large leak
1.3% per night
Average leak
7.9


Tidal volume (mL)
992
744
496
248
0
Average tidal volume
786.4

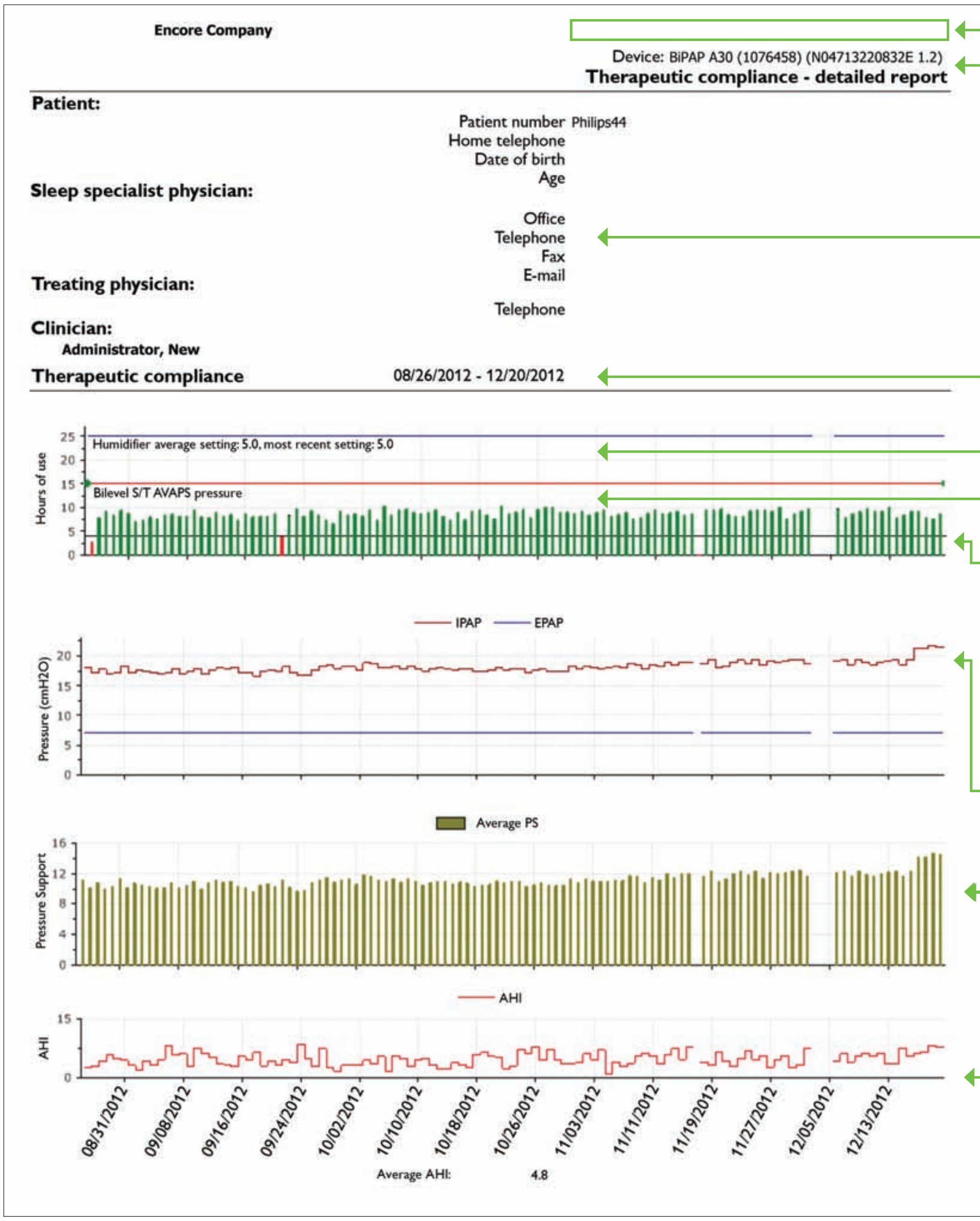

Pressure (cmH2O)
IPAP
EPAP
Avg. IPAP
18.4
Avg. EPAP
7.0

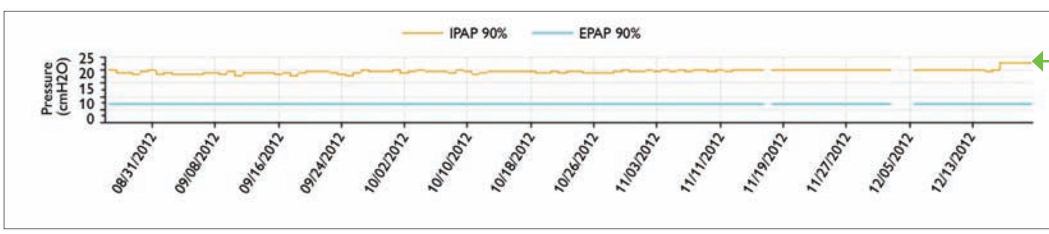

Minute Ventilation
Average Minute
Ventilation
12.3

Patient compliance and pressure profile BiPAP AVAPS



BiPAP A30





Patient name and machine

Machine detail
Name, serial number

Patient information

Period covered by the report

Humidifier settings if it is attached to the machine

Ventilation mode used

Length of compliance per night
Nights of insufficient use (under the set threshold) are indicated in red.
Note: this parameter can be customized in the Encore software.

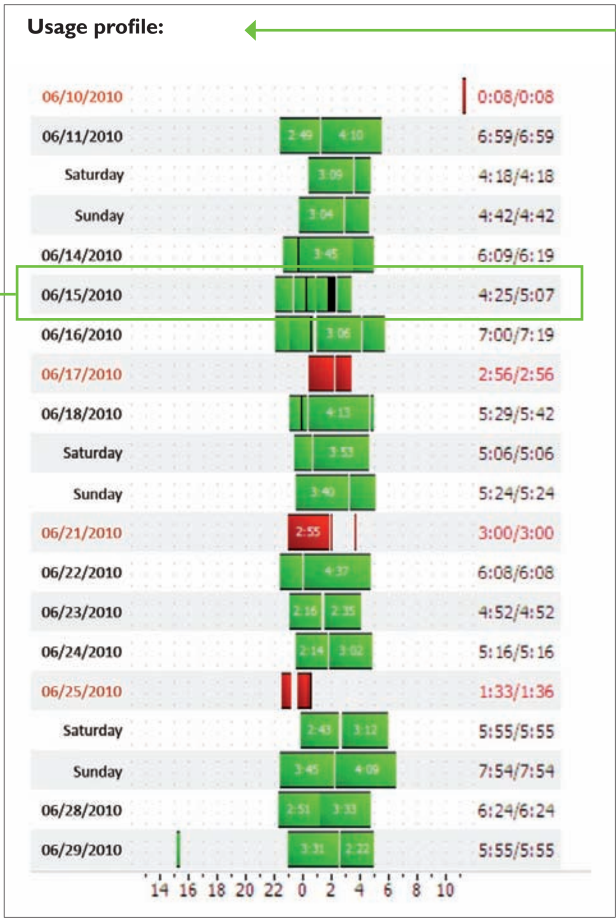
Pressure profile
IPAP Inspiratory Pressure
EPAP Expiratory Pressure

Pressure Support (PS) profile
PS = IPAP - EPAP
Note: use of the AVAPS function allows a variation of PS over time

Apnea-hypopnea index (AHI)
Average AHI over the selected period

IPAP 90 corresponds to IPAP delivered for 90% of the night

EPAP 90 corresponds to EPAP delivered for 90% of the night; the pressure is set here



Profile usage: daily compliance
Note: the profile provides a first idea about the patient's behavior regarding therapy. Irregular and insufficient compliance indicates difficulties the patient is encountering, and/or a lack of motivation.

The nights in green indicate that compliance time is sufficient; those in red indicate that the patient is not sufficiently compliant.

The 1st number represents the number of real compliance hours, the 2nd number is that of blower hours (ventilation is functioning but without detecting the patient's breathing).

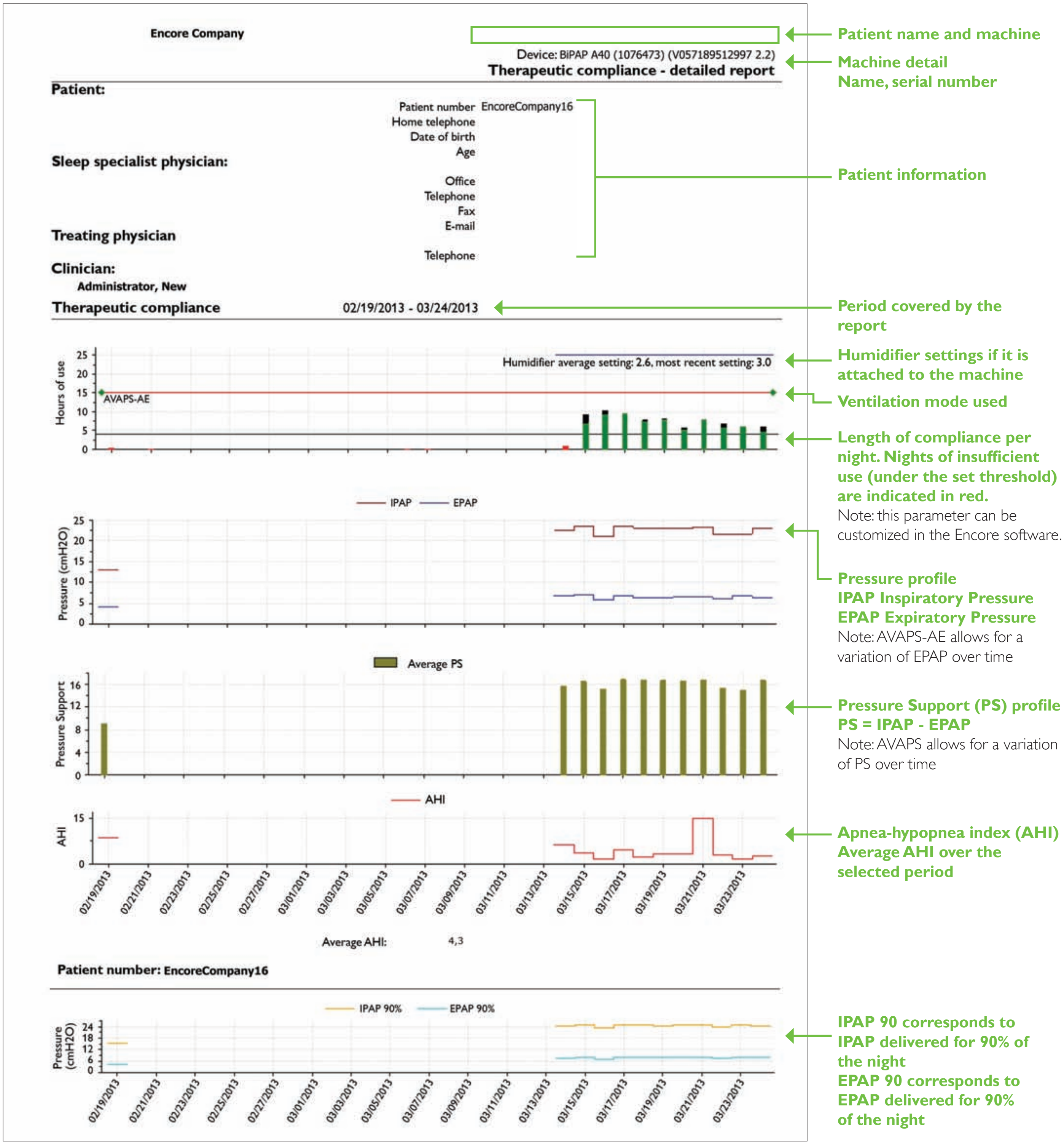


Green: Blower functioning, patient breathing detected

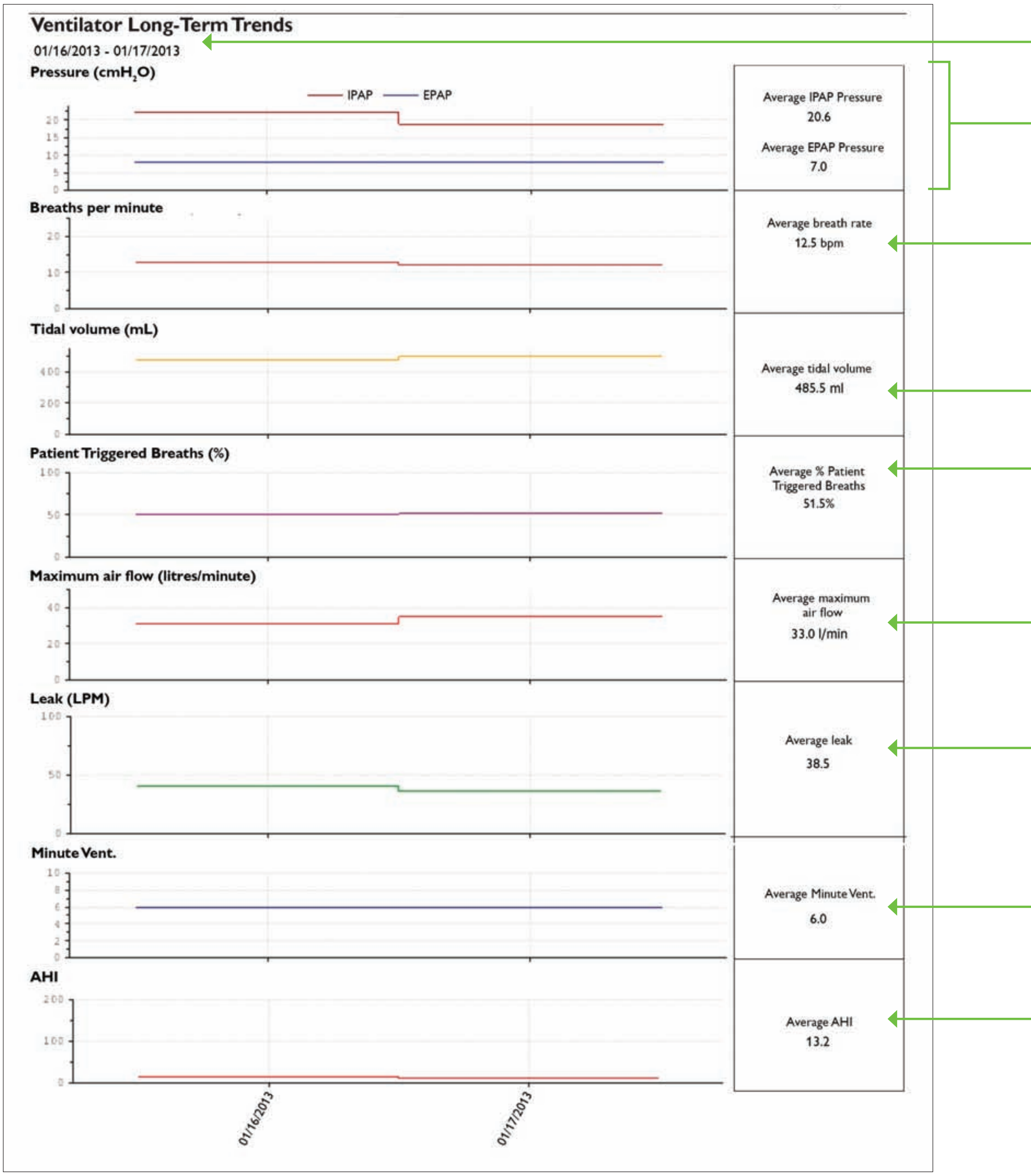
White: Blower stopped

Black: Blower functioning, but without detecting breaths
Note: activation of the machine's automatic start/stop prevents the blower from functioning without being connected to the patient

BiPAP A40


Encore Company
Device: BiPAP A40 (1076473) (V057189512997 2.2)
Therapeutic compliance - detailed report
Patient:
Patient number EncoreCompany16
Home telephone
Date of birth
Age
Sleep specialist physician:
Office
Telephone
Fax
E-mail
Treating physician
Telephone
Clinician:
Administrator, New
Therapeutic compliance 02/19/2013 - 03/24/2013
Hours of use
Humidifier average setting: 2.6, most recent setting: 3.0
AVAPS-AE
IPAP
EPAP
Pressure (cmH2O)
Average PS
Pressure Support
AHI
Average AHI: 4,3
Patient number: EncoreCompany16
IPAP 90%
EPAP 90%
Pressure (cmH2O)
Patient name and machine
Machine detail
Name, serial number
Patient information
Period covered by the report
Humidifier settings if it is attached to the machine
Ventilation mode used
Length of compliance per night. Nights of insufficient use (under the set threshold) are indicated in red.
Note: this parameter can be customized in the Encore software.
Pressure profile
IPAP Inspiratory Pressure
EPAP Expiratory Pressure
Note: AVAPS-AE allows for a variation of EPAP over time
Pressure Support (PS) profile
PS = IPAP - EPAP
Note: AVAPS allows for a variation of PS over time
Apnea-hypopnea index (AHI)
Average AHI over the selected period
IPAP 90 corresponds to IPAP delivered for 90% of the night
EPAP 90 corresponds to EPAP delivered for 90% of the night

Long-term BiPAP AVAPS trends



Period involved in the long-term trend. This period can be modified using the Encore software.

Average inspiratory and expiratory pressure over the period
Note: Variation in the inspiratory pressure may indicate the activation of the AVAPS function, or modification of the parameter.

Average respiratory frequency over the period

Average tidal volume for the period
Note: If the AVAPS is activated, this value makes it possible to check whether the set volume is being met.

Average percentage of breaths triggered by the patient
Note: The lower the percentage, the more the machine initiates the breaths.
This makes it possible to know the percentage of time spent in machine-initiated cycles.

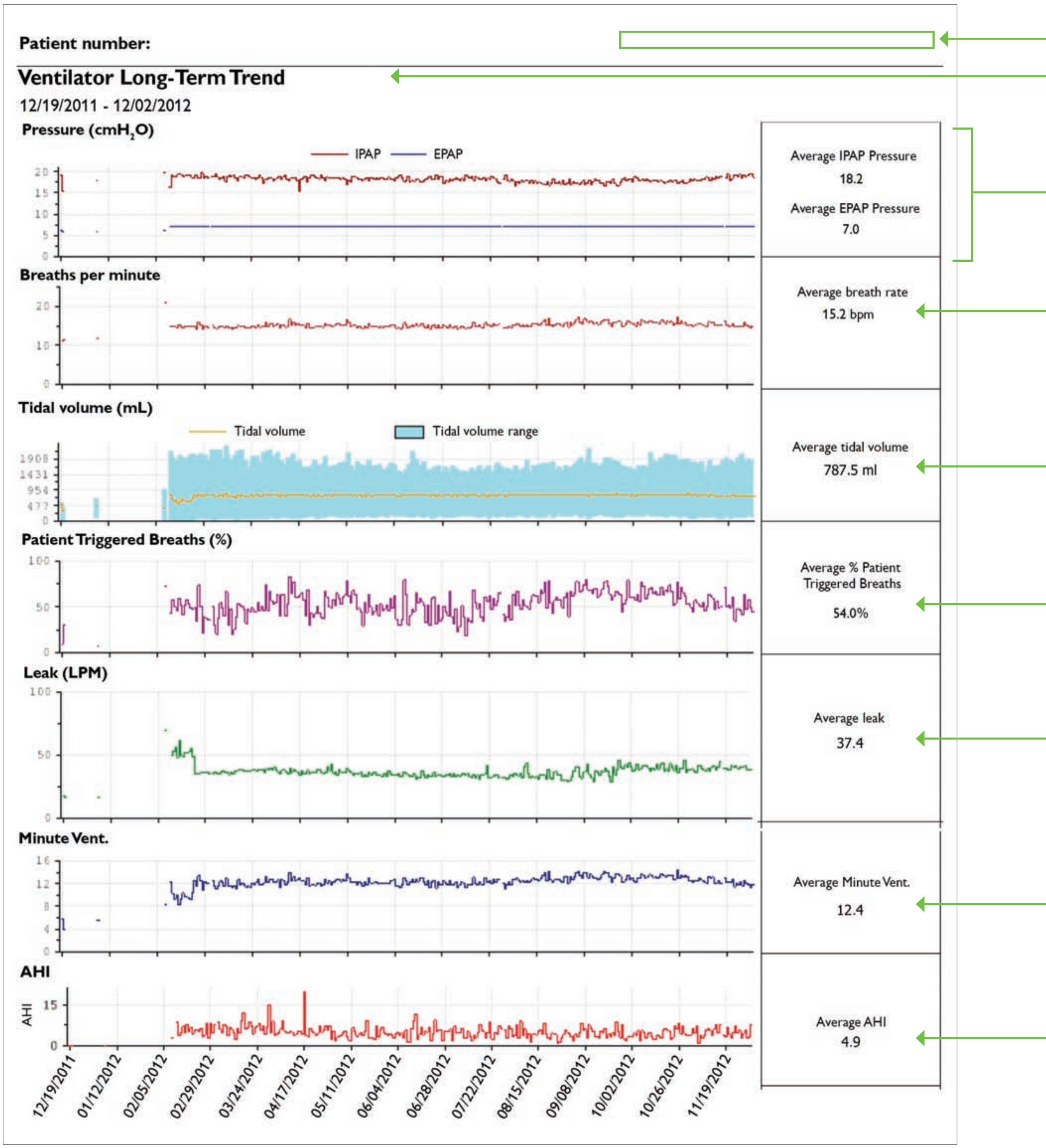
Average maximum flow over the period in litres/minute

Average leakage over the period in litres/minute

Average minute ventilation over the period in litres/minute

Average Apnea-Hypopnea Indices over the period
Note: AHI counts the number of Apneas (with and without obstruction), and the Hypopneas per hour.

Long-term BiPAP A30 1/2 trends



Patient name and machine

Period involved in the long-term trend. This period can be modified using the Encore software.

Average inspiratory and expiratory pressure over the period
Note: Variation in the inspiratory pressure indicates the activation of the AVAPS function, or modification of the parameter.
Expiratory pressure also varies with an A40 and the AVAPS-AE mode.

Average respiratory frequency over the period

Average tidal volume for the period
Note: If the AVAPS is activated, this value makes it possible to check whether the set volume is being met

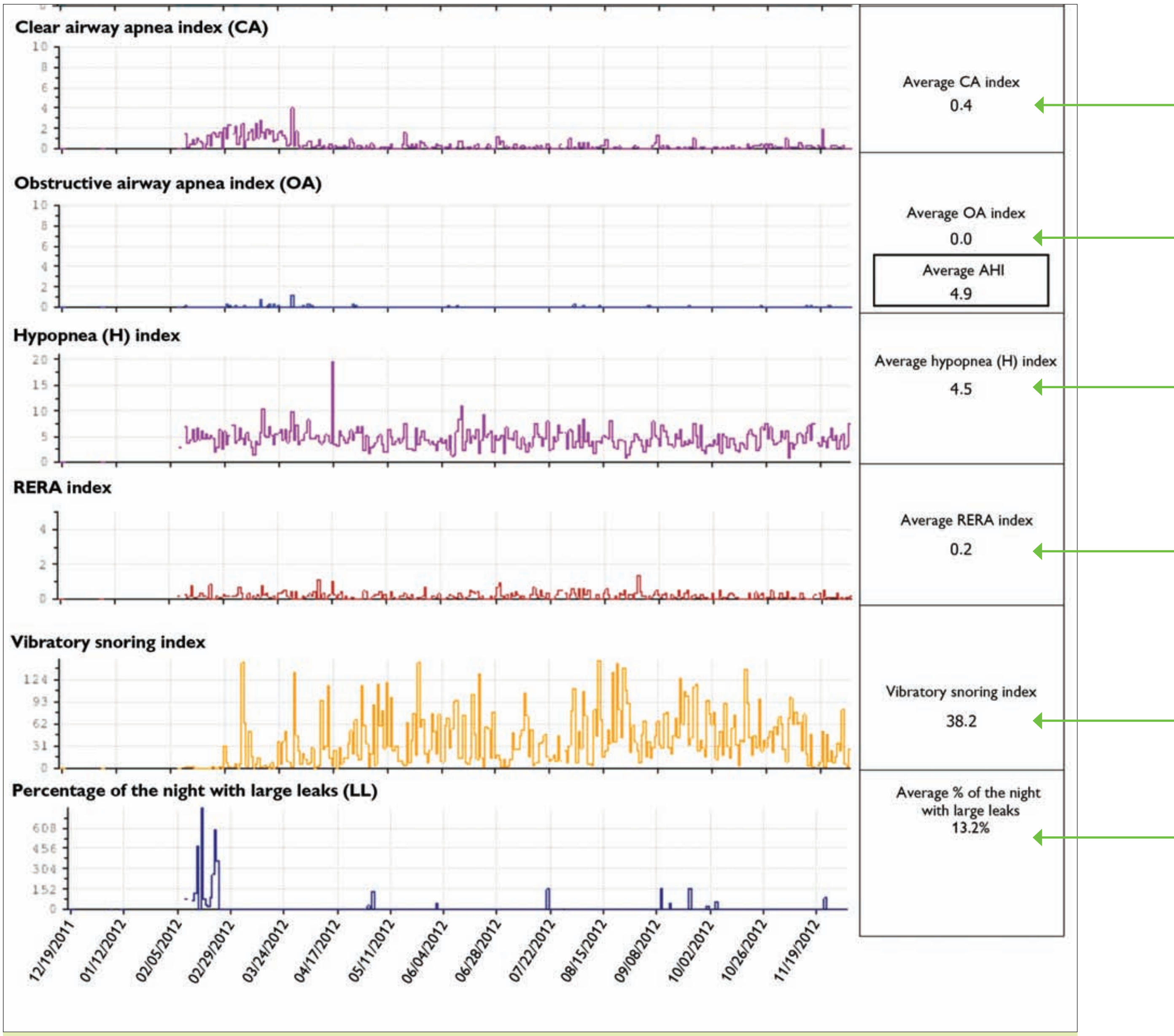
Average percentage of breaths triggered by the patient
Note: The lower the percentage, the more the machine initiates the breaths.
This makes it possible to know the percentage of time spent in machine-initiated cycles.

Average leakage in litres/minute

Average minute ventilation over the period in litres/minute

Average Apnea-Hypopnea Indices over the period
Note: AHI counts the number of apneas (with and without obstruction), and the hypopneas per hour.

Long-term BiPAP A30 2/2 trends



The long term trends show the patient's progression.
For example, an unstable average tidal volume may indicate a changed ventilation quality.

Average clear airway apnea index (CA) over the period

Average obstructive airway apnea index (OA) over the period

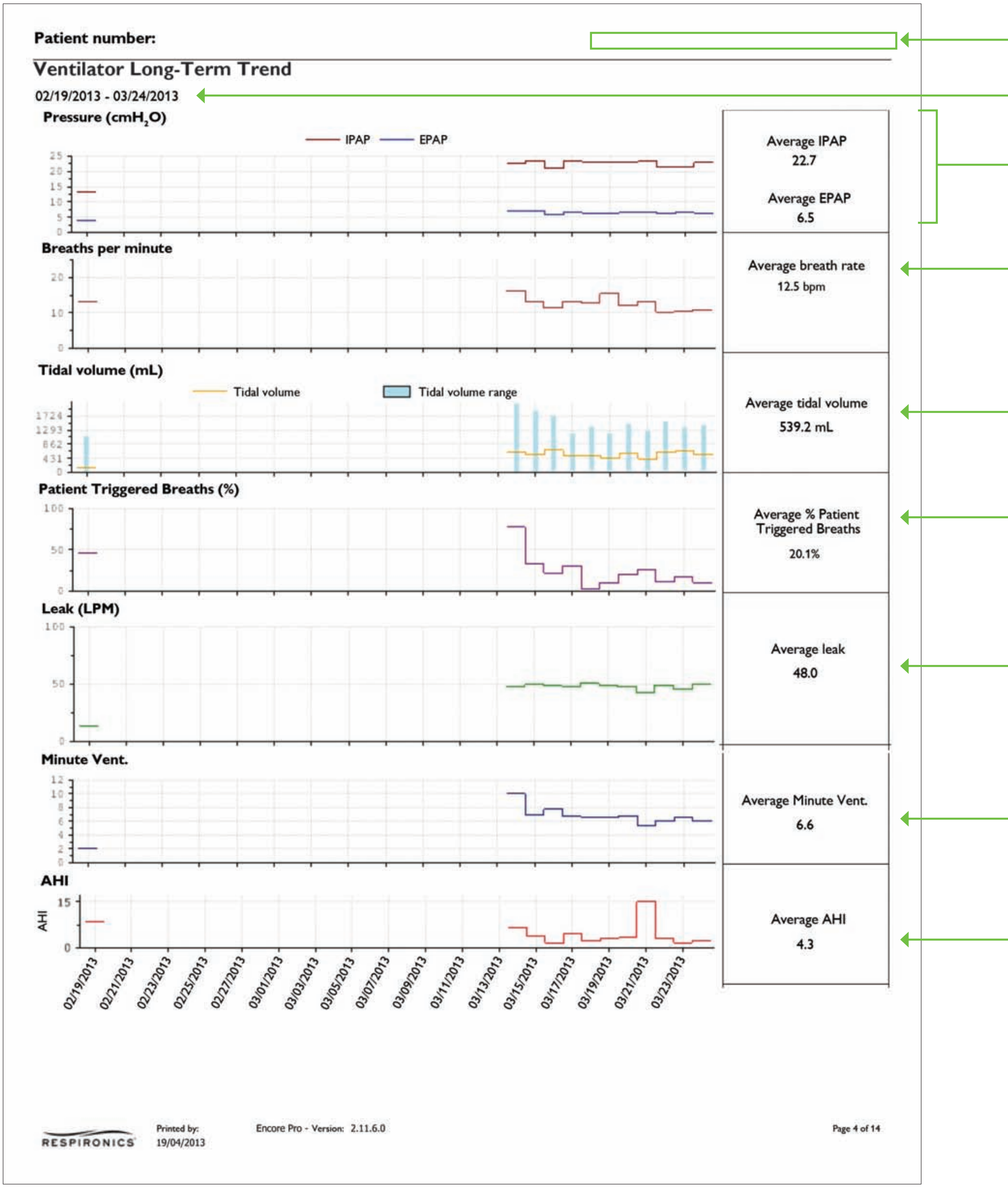
Average hypopnea (H) index over the period

Average RERA (RE) index over the period

Vibratory snoring (VS) index over the period

Average percentage of the night spent with large leaks during the period
Note: In this example, the percentage during the first nights in February 2012 was too high for the ventilation to be effective. The issue was obviously resolved, and there were a few episodes of large leakage only during a few nights

Long-term BiPAP A40 1/2 trends



Patient name and machine

Period involved in the long-term trend. This period can be modified using the Encore software.

Average inspiratory and expiratory pressure over the period
Note: Activation of the AVAPS-AE mode allows a variation of inspiratory and expiratory pressure.

Average respiratory frequency over the period
Note: Automatic respiratory frequency allows a safety frequency closer to the spontaneous respiration of the patient.

Average tidal volume for the period
Note: This value makes it possible to check whether the set volume is being met.

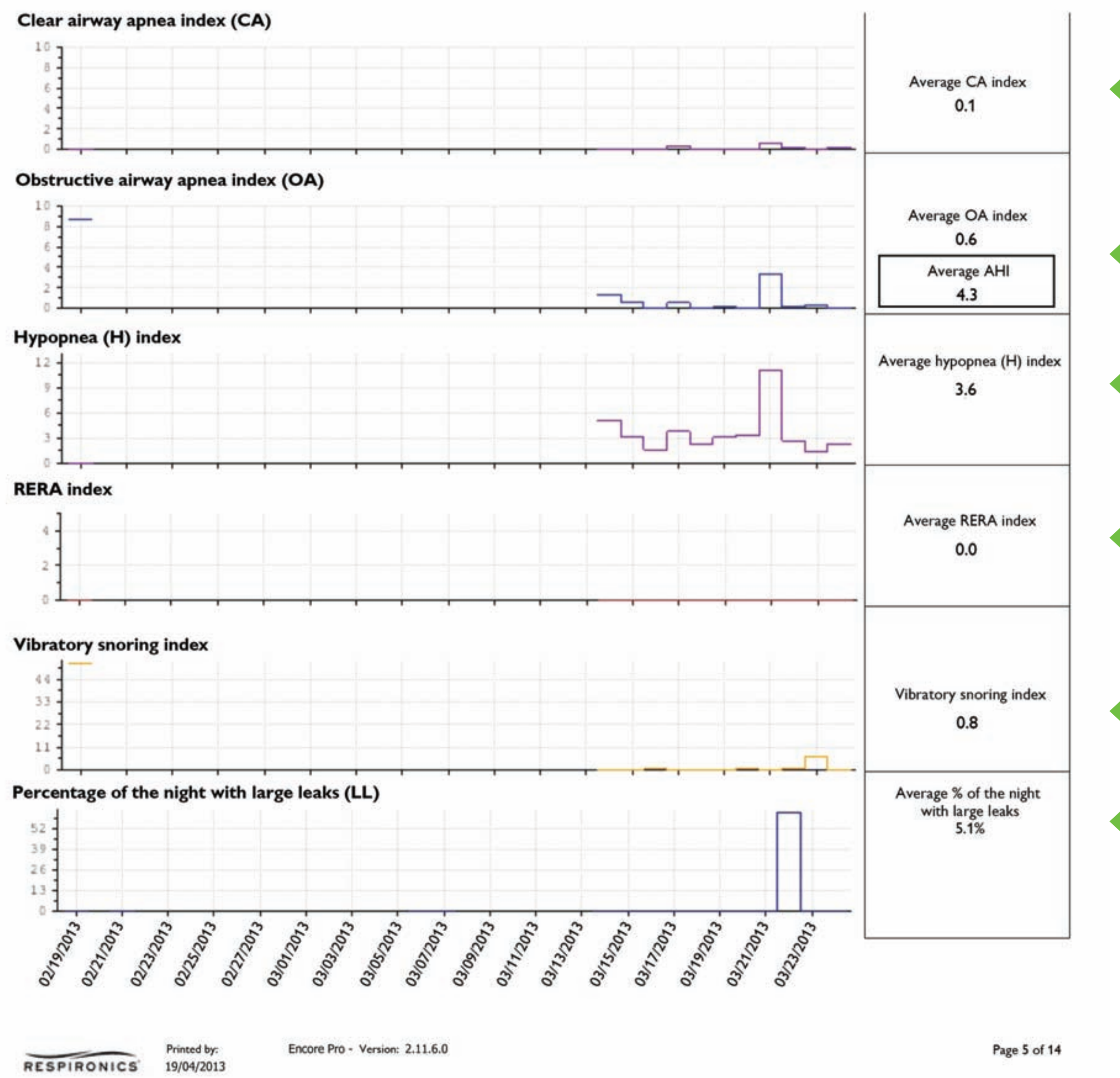
Average percentage of breaths triggered by the patient
Note: The lower the percentage, the more the machine initiates the breaths.
This makes it possible to know the percentage of time spent in machine-initiated cycles.

Average leakage in litres/minute

Average minute ventilation over the period in litres/minute

Average Apnea-Hypopnea Indices over the period
Note: AHI counts the number of apneas (with and without obstruction), and the hypopneas per hour.

Long-term BiPAP A40 2/2 trends



The long-term trends show the patient's progression.
For example, an unstable average tidal volume may indicate a changed ventilation quality.

Average clear airway apnea index (CA) over the period

Average obstructive apnea index (OA) over the period

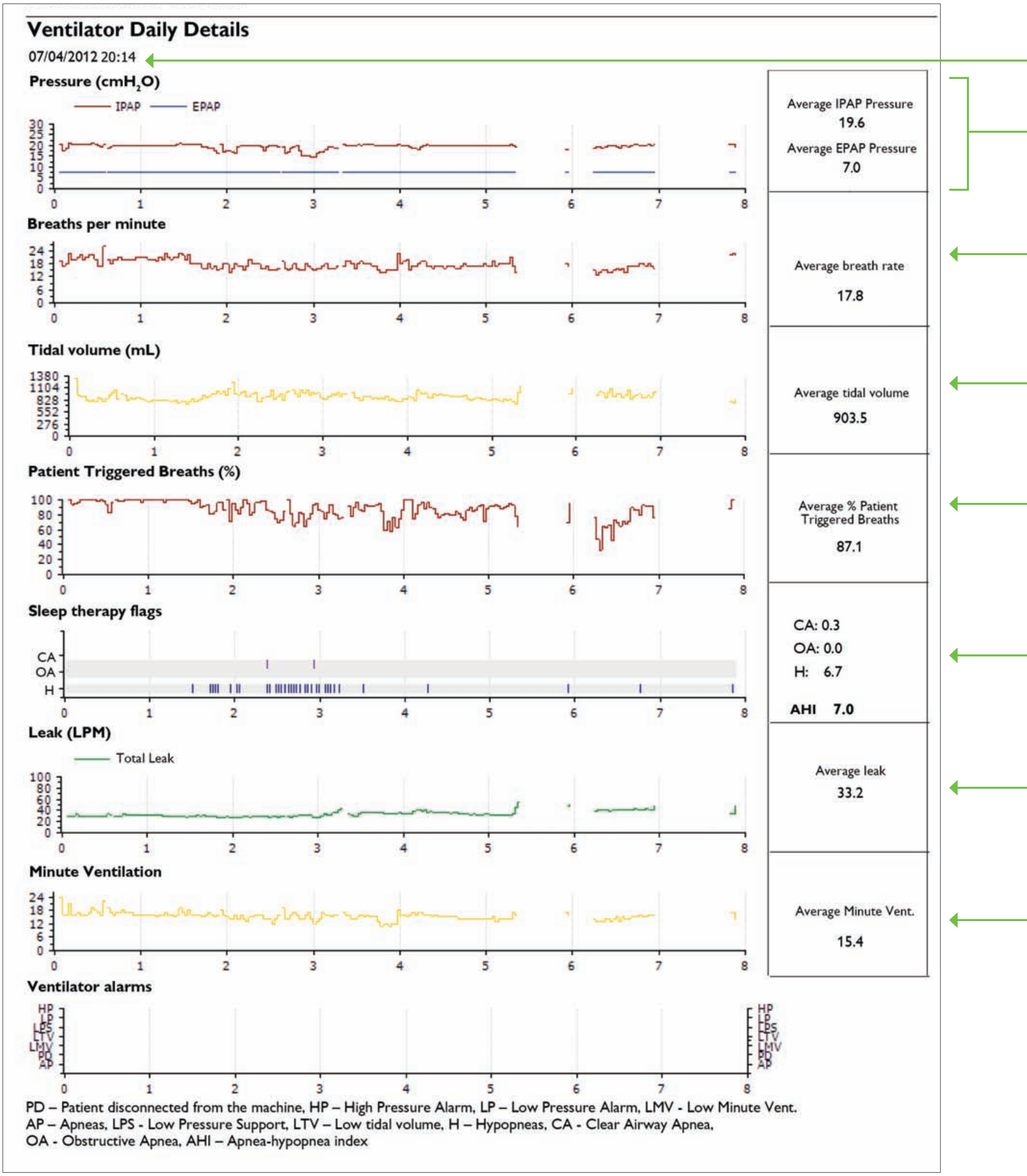
Average hypopnea (H) index over the period

Average RERA (RE) index over the period

Vibratory snoring (VS) index over the period

Average percentage of the night spent with large leaks during the period
Note: In this example, a large leak occurred one night. This large leak is reflected in the analysis of other data from the report.

Daily BiPAP AVAPS details



Day involved

Profile for the day's inspiratory and expiratory pressures
Note: Variation in the inspiratory pressure may indicate the activation of the AVAPS function.

Average respiratory frequency for the day

Average tidal volume for the day
Note: If the AVAPS is activated, this value makes it possible to check whether the set volume is being met.

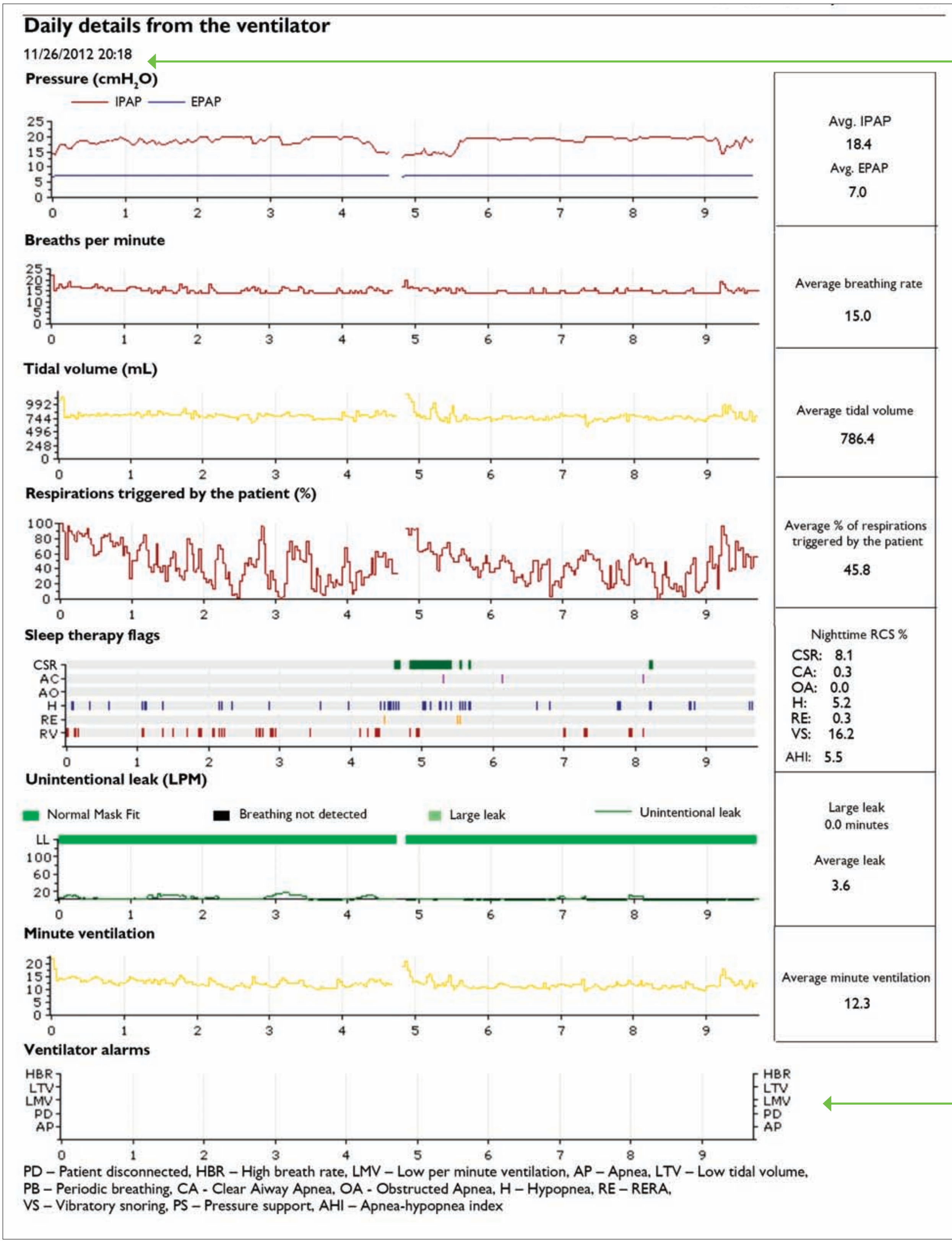
Average percentage of breaths triggered by the patient
Note: The lower the percentage is, the more the machine initiates the breaths.
This makes it possible to know the percentage of time spent in machine initiated cycles.

Average leakage in litres/minute for the day

Average ventilation-minutes for the day in litres/minute

Ventilator alarms that occurred during the day

Daily BiPAP 30 details



Day involved and treatment start time

Profile for the day's inspiratory and expiratory pressures
Note: Here we see that the AVAPS function has been activated, because the inspiratory pressure varies widely to maintain the target volume.

Average respiratory frequency for the day

Average and tidal volume for the day
Note: If the AVAPS is activated, this value makes it possible to check whether the set volume is being met.

Average percentage of respirations triggered by the patient
Note: A percentage close to zero indicates that the patient is resting over the set safety frequency, or that this frequency is set too high.

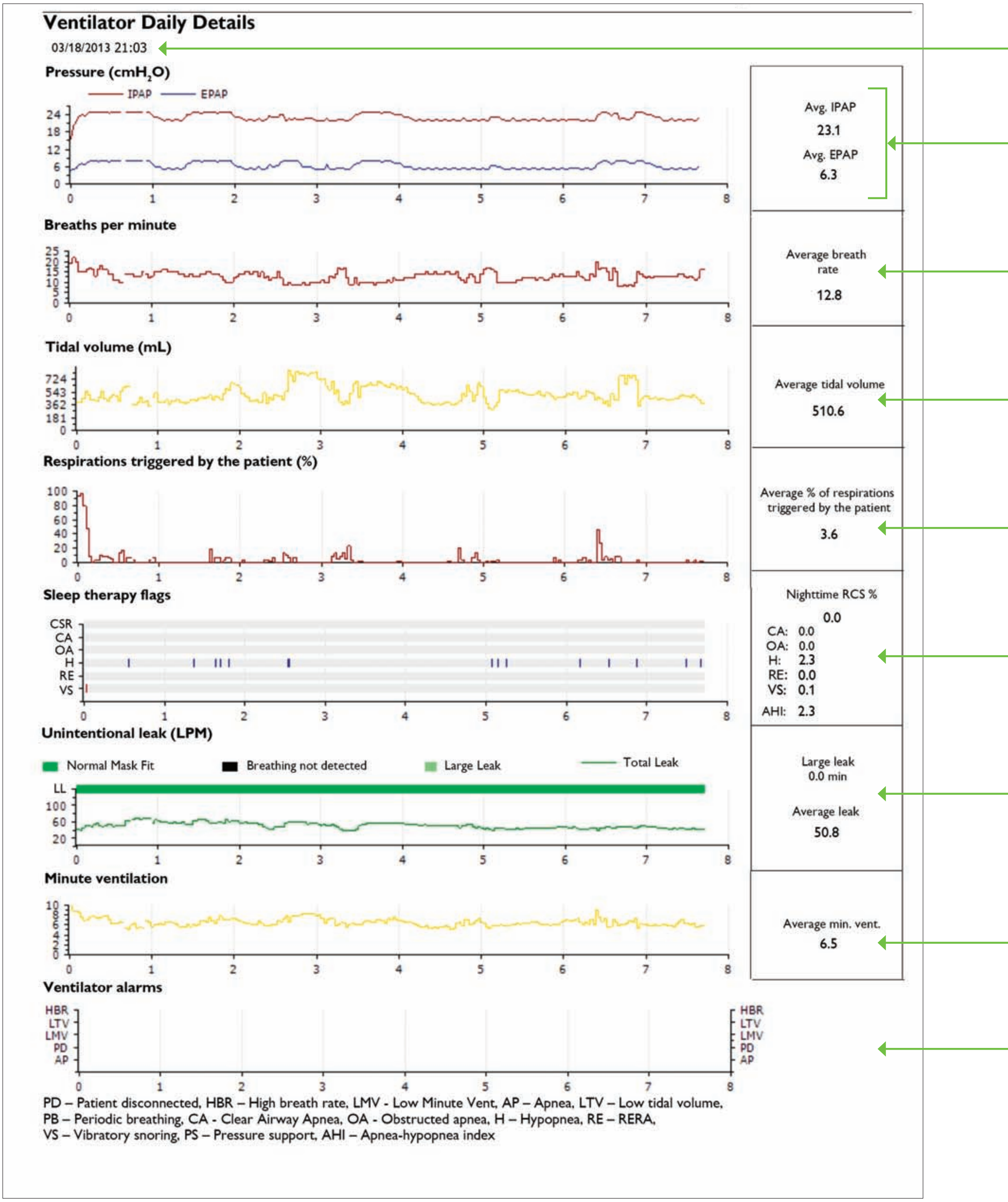
Index for sleep events
Note: Indices can be correlated with ventilator data.

Unintentional leak profile during the course of the day
Note: Here we can choose to have the total leaks displayed instead of unintentional leaks (can be configured in Encore software).
The color code and legend make it possible to verify the mask's seal in the blink of an eye.

Average ventilation-minutes for the day in litres/minute

Ventilator alarms that occurred during the day

Daily BiPAP 40 details



Day involved and treatment start time

Profiles for the day's inspiratory and expiratory pressures
Note: Here we see that the AVAPS-AE mode has been activated, because the inspiratory pressure varies to maintain the target volume, and the expiratory pressure to raise resistances.

Average respiratory frequency for the day

Average and tidal volume for the day
Note: This value makes it possible to check whether the set volume is being met.

Average percentage of respirations triggered by the patient
Note: A percentage close to zero indicates that the patient is resting over the set back-up rate.

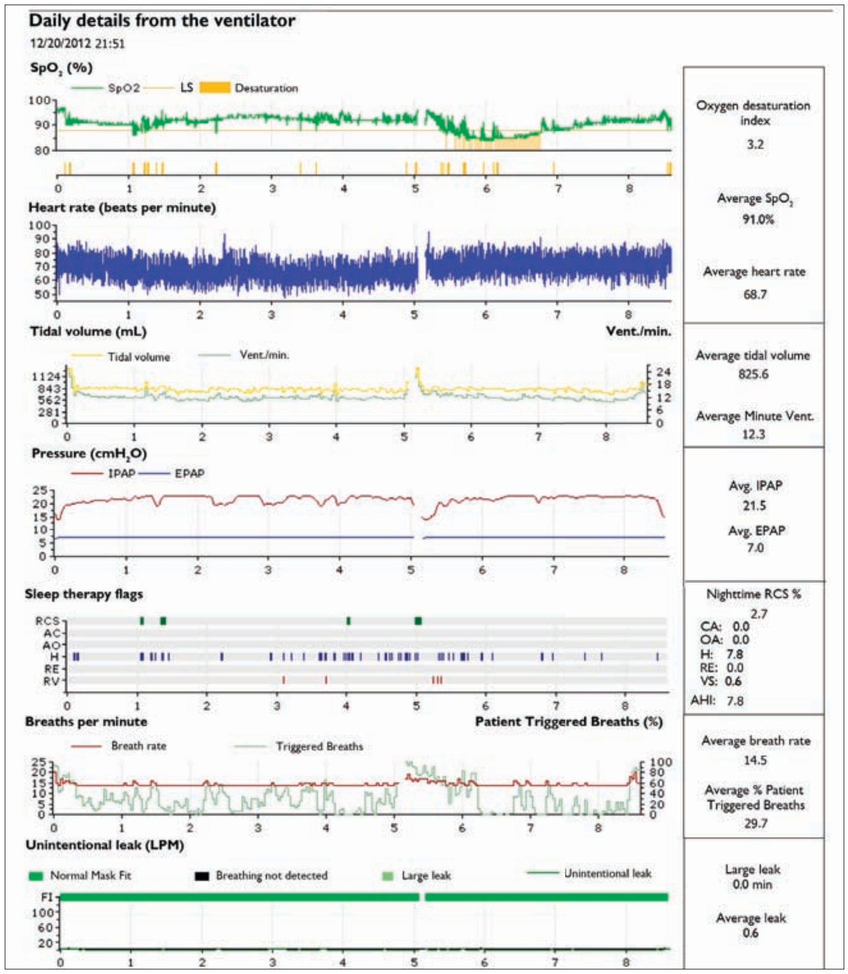
Index for sleep events.
Note: Indices can be correlated with ventilator data.

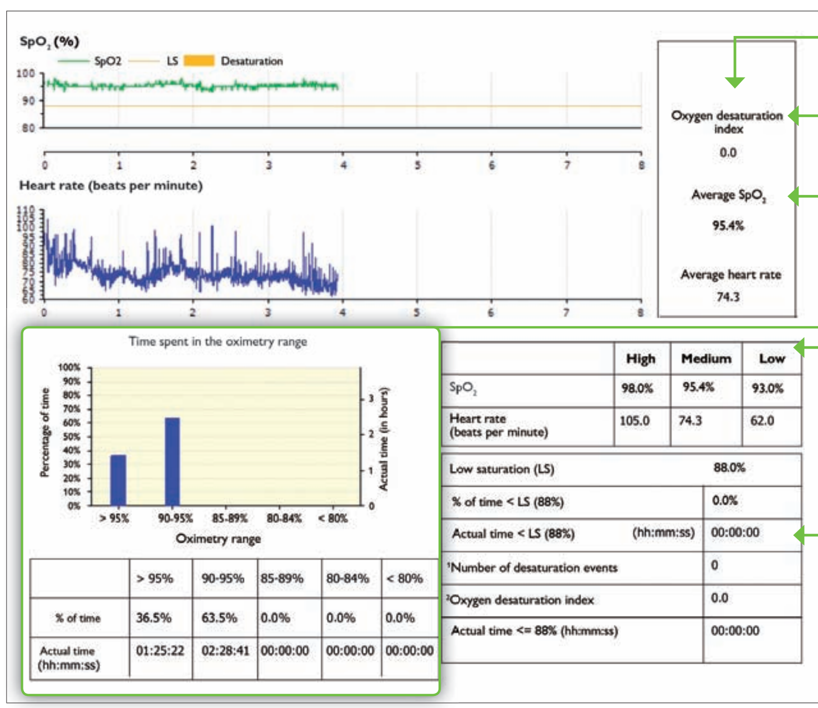
Unintentional leak profile during the course of the day
Note: Here we can choose to have the total leaks displayed instead of unintentional leaks (can be configured in Encore software).
The color code and legend make it possible to verify the mask's seal in the blink of an eye.

Average minute ventilation for the day in litres/minute

Ventilator alarms that occurred during the day

Oximetry data





Oxygen saturation profile for the day concerned
SpO_2 saturation curve in %
Note: The Low Saturation (LS) threshold can be set in Encore software. It is 88% by default.
Desaturation periods are displayed in yellow.

Desaturations can be correlated with ventilator data and benchmarks from the sleep treatment.

The oxygen desaturation index represents the number of desaturation events per hour of treatment
A desaturation event is defined as a reduction of SpO_2 of 4% or more over a window of less than 2 minutes
Note: If the patient desaturates several times during a window of 2 minutes, all events will be reported each time the reduction of SpO_2 is greater than or equal to 4%.
However, a slow and progressive desaturation that takes more than 2 minutes to reach at least a 4% reduction will not be counted as a desaturation event.

Average SpO_2 of the night

Average heart rate of the night

Graphic chart representing the percentages and real time of the night spent in different levels of oxygen saturation

Maximum, minimum and average values of SpO_2 and heart rate during the night

Low saturation (LS) = an oxygen saturation threshold of less than or equal to 88%.
This low saturation threshold can be customized in the Encore software (tab > calculation parameters).

Statistics, compliance summary and settings

Statistical data on the ventilator by month

		08/01/2012	09/01/2012	10/01/2012	11/01/2012	12/01/2012
AHI	Min	2.5	1.8	1.8	1	3.2
	Max	5.8	8.6	7.9	7.7	8.1
	Avg.	4.4	4.6	4.5	4.8	5.7
Expiratory pressure achieved	Min	7	7	7	7	7
	Max	7	7	7	7	7
	Avg.	7	7	7	7	7
Inspiratory pressure achieved	Min	16.9	16.6	17.3	17.8	18.6
	Max	18.3	18.5	18.8	19.4	21.7
	Avg.	17.5	17.5	17.9	18.6	19.5
Back-up rate	Min	14.7	14.9	14.9	14.7	14.4
	Max	15.8	17.1	17.3	16.1	16.4
	Avg.	15.3	16	15.9	15.3	15.1
Expired tidal volume	Min	791.1	777.3	784.4	753.3	756.6
	Max	812.6	828.6	845.1	806.4	832.2
	Avg.	802.7	805.5	805.4	783	788
Unintentional Leak	Min	0.1	0	1.2	1.4	0.3
	Max	2.5	10.8	10.7	8.4	4.7
	Avg.	0.8	3.9	4.7	3.6	2.2
Percentage of patient triggered breaths	Min	39.8	45.1	52.4	35.2	27.4
	Max	65.2	79.7	76.4	71.2	72.1
	Avg.	54.4	67.4	64.2	52.7	48
Minute Ventilation	Min	12.1	12.2	12.3	11.4	11.5
	Max	13.1	14.2	14.5	13.3	13.7
	Avg.	12.6	13.3	13.2	12.4	12.3

Patient number: Philips48 — **Chart 4 of 4, BiPAP A30**

Compliance summary – full

Compliance statistics

Date range	12/19/2011 - 12/02/2012 (350 days)
Days with device usage	298 days
Days without device usage	52 days
Percent of days with device usage	85.1%
Cumulative usage	96 days 12 h 5 minutes 47 s
Maximum usage (1 day)	10 h 30 minutes 31 s
Average usage (all days)	6 h 37 minutes 2 s
Average usage (days used)	7 h 46 minutes 19 s
Minimum usage (1 day)	34 s
Percent of days with usage ≥ 4 hours	82.6%
Percent of days with usage < 4 hours	17.4%
Total blower time	96 days 14 h 18 minutes 42 s

Settings

Mode:	Bilevel S/T AVAPS pressure
Insp. P. Max.:	20.0
Insp. P. Min.:	14.0
Exp. P.:	7.0
AVAPS rate:	4.0
Target tidal volume:	800.0
Breathing rate:	14 cycles/min.

Statistical data

Data can be displayed by day, week, month (opposite) and quarter

Note: This information makes it possible to observe the evolution of ventilator data and to appraise the patient's stability.

Real usage, meaning the total compliance over the entire treatment period of the report

Note: In this example, the real usage figures and blower usage are identical. This indicates that the machine properly detected the patient breathing during the entire treatment period (absence of patient disconnection).

Days of usage over 4 hours

Note: It is possible to modify the minimum compliance level in Encore softwares (Preferences).

Blower usage

Primary parameters settings

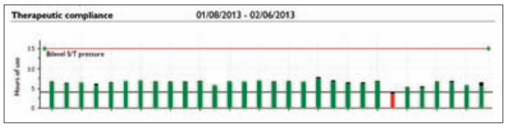
Note: Settings correspond to the last parameters set on the ventilator during downloading.

Note: These settings are displayed by the BiPAP A30 and BiPAP A40.

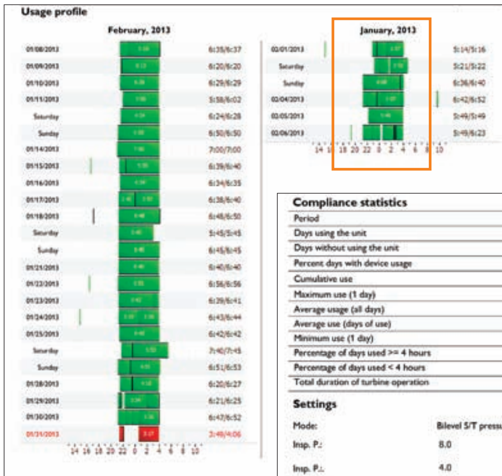
AVAPS air flow represents the variation speed of pressure in cmH_2O/min to reach the target volume.

Practical case 1:

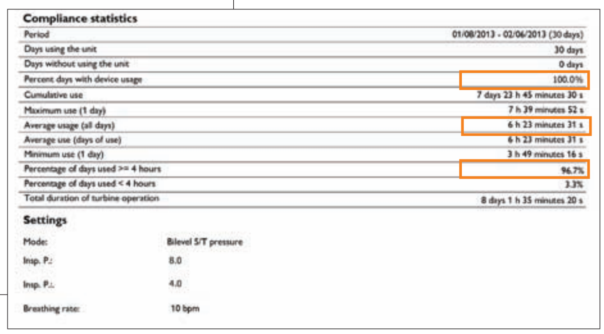
1. Compliance check



The patient is ventilated with a BiPAP A30 in S/T mode. He appears compliant.



Ventilation is more fragmented; some areas of respiration non-detection (black areas) appear more and more.



Compliance statistics

Period	01/08/2013 - 02/06/2013 (30 days)
Days using the unit	30 days
Days without using the unit	0 days
Percent days with device usage	100.0%
Cumulative use	7 days 23 h 45 minutes 30 s
Maximum use (1 day)	7 h 39 minutes 52 s
Average usage (all days)	6 h 23 minutes 31 s
Average use (days of use)	6 h 23 minutes 31 s
Minimum use (1 day)	3 h 49 minutes 16 s
Percentage of days used >= 4 hours	96.7%
Percentage of days used < 4 hours	3.3%
Total duration of turbine operation	8 days 1 h 35 minutes 20 s

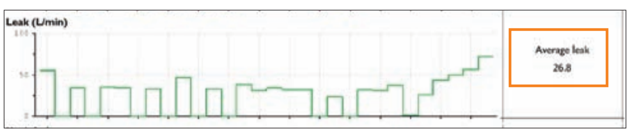
Settings

Mode:	Bilevel S/T pressure
Insp. P.:	8.0
Insp. P.:	4.0
Breathing rate:	10 bpm

The usage profile is regular, the lengths of ventilation are consistent.

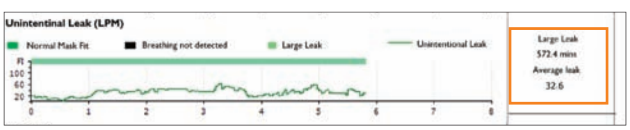
2. Check for leaks

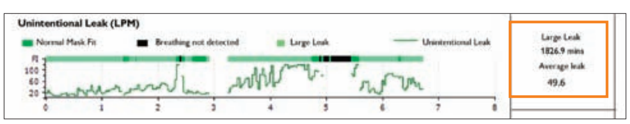
a. Through trends



The average total leakage is acceptable.
But the leakage profile is completely chaotic.

b. Through daily details





Through the daily details, the leaks (unintentional) are much too large. Leaks are present throughout the night.

Recommendation:

There is no use in continuing the analysis of this report since the level of leaks is too high. Before modifying any of the ventilation parameters, it is imperative to find the cause of the leaks. It is advisable to review the placement and the seal of the interface with the patient.

Practical case 2:

1. Compliance and settings check

Compliance statistics

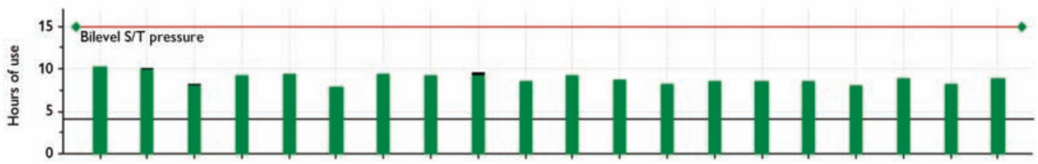
Date range	03/22/2012 - 04/10/2012 (20 days)
Days with device usage	20 days
Days without device usage	0 days
Percent of days with device usage	100.0%
Cumulative usage	7 days 8 h 43 minutes 3 s
Maximum usage (1 day)	10 h 13 minutes 24 s
Average usage (all days)	8 h 50 minutes 9 s
Average usage (days used)	8 h 50 minutes 9 s
Minimum usage (1 day)	7 h 51 minutes 53 s
Percent of days with usage ≥ 4 hours	100.0%
Percent of days with usage < 4 hours	0.0%
Total blower time	7 days 8 h 56 minutes 16 s

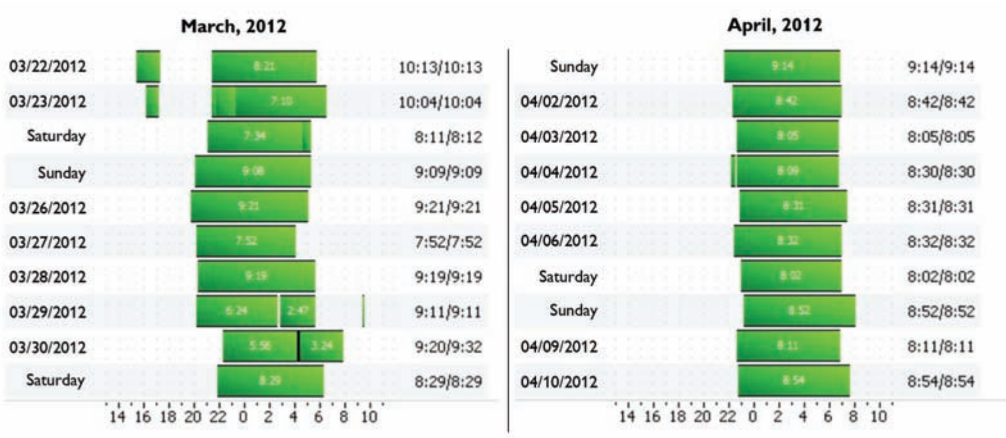
Settings

Mode:	Bilevel S/T pressure
Insp. P.:	14.0
Insp. P.:	4.0
Breathing rate:	12 bpm

The patient is ventilated with a BiPAP A30 in S/T mode. He seems very compliant.

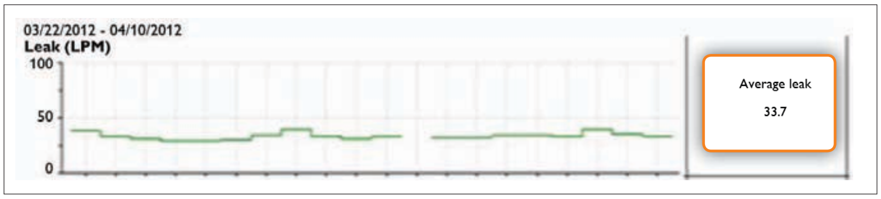
Therapeutic compliance 03/22/2012 - 04/10/2012



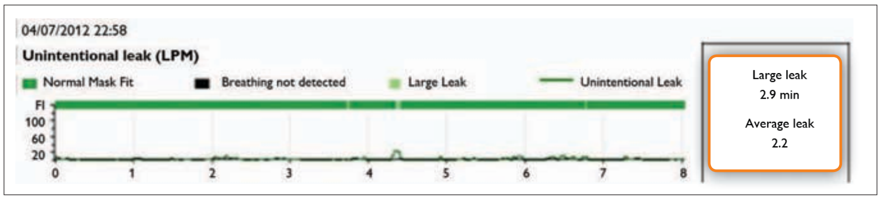


2. Check for leaks

a. Through trends



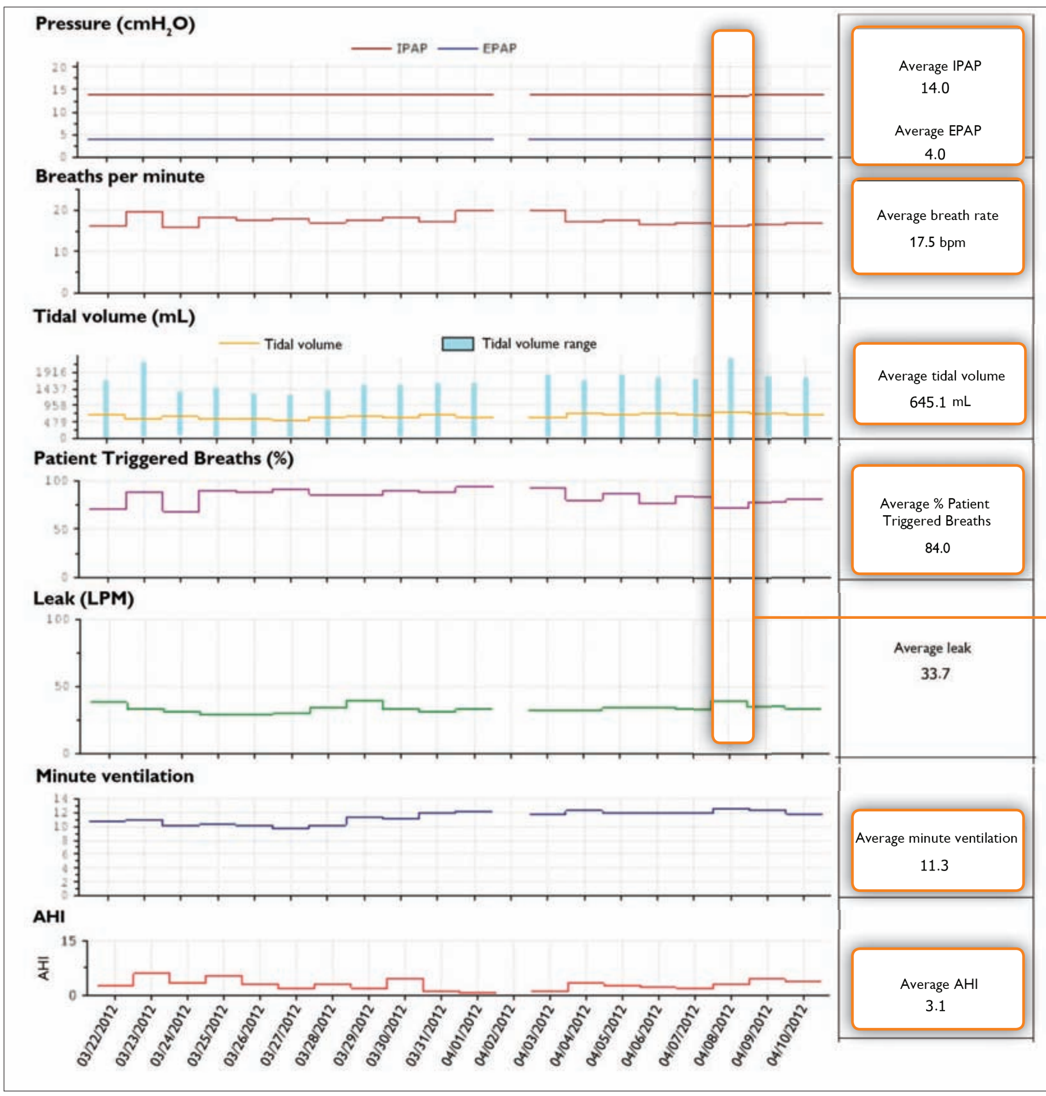
b. Through the daily details (through on of the last days of the period)



The leaks (total through the trends and unintentional leaks in the daily details in this example) are stable and very acceptable.

3. Check of the ventilator data

a. Through trends

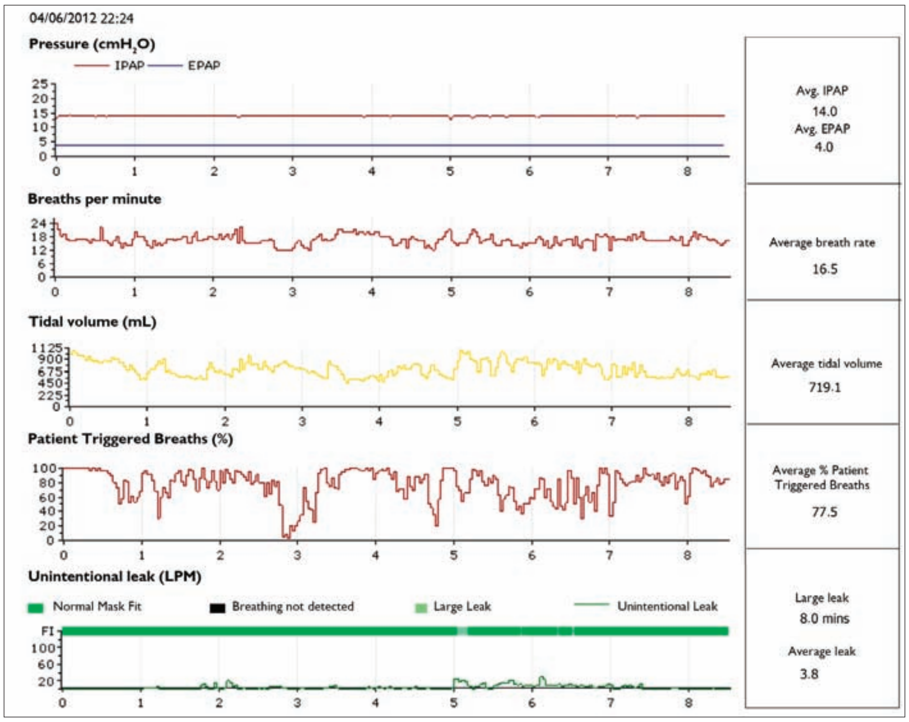


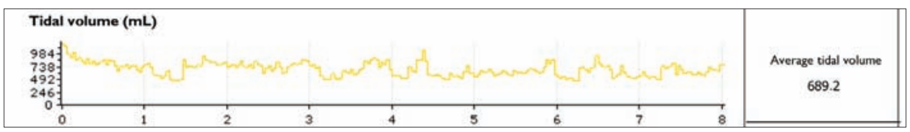
There is nothing particular to report through the trends; the parameters are correct.

The machine is properly delivering the set fixed pressures, the patient triggers the cycles spontaneously the majority of the time, and ventilation-minutes are correct.

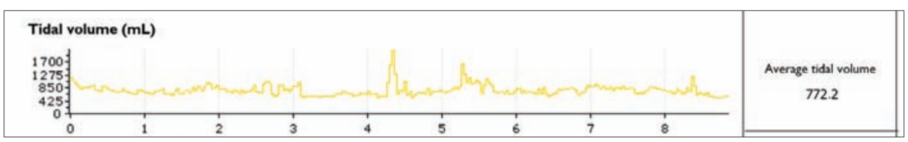
It was noted that the leaks may be causing the pressure delivered to the patient to fall slightly.

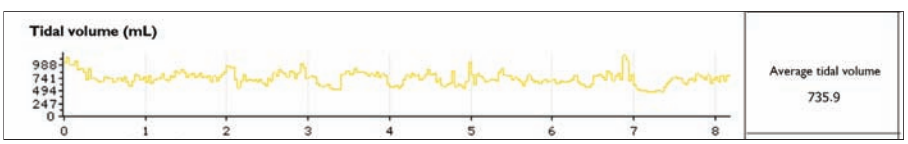
b. Through daily details





Through the daily details, we can see that the volume curve is extremely variable, the tidal volume taken by the patient often varies from one to two times in a few hours, while the average tidal volume over the entire night is correct.





The same significant variations in tidal volume on the following nights.

Recommendation:

When the fixed pressures are set, it is normal to detect that the volume exhaled by the patient varies over time, because his respiratory mechanics (compliance and resistance) varies along with his position and his sleep stages.

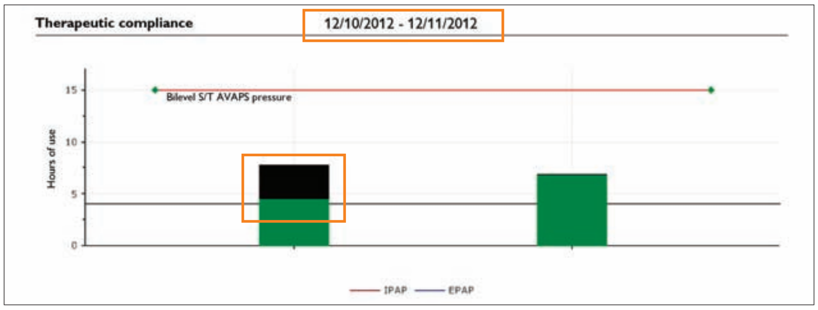
For this patient, the doctor will probably want to perform a check on O_2 saturation to make sure that these variations in tidal volume are not leading to periods of desaturation.

Also, the activation of the AVAPS function has made it possible to stabilize the volume (setting of the target tidal volume based on the patient's theoretical weight, certainly 700 mL according to the ratio), since the ventilator can be made to vary the inspiratory pressure in a pressure window to be determined, in order to guarantee the target tidal volume.

Practical case 3:

1. Compliance and settings check

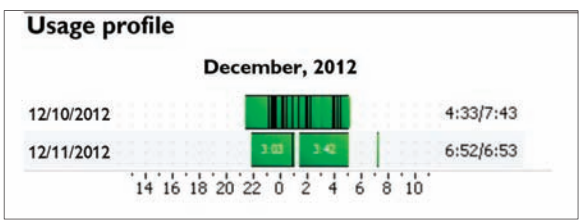
The patient is ventilated with a BiPAP AVAPS in S/T + AVAPS mode (information read on the 1st page of the report) This mode was chosen to facilitate titration and the start-up of the treatment. Data was collected after the first two nights of use.



Compliance statistics

Date range	12/10/2012 - 12/11/2012 (2 days)
Days with device usage	2 days
Days without device usage	0 days
Percent of days with device usage	100.0%
Cumulative usage	11 h 24 minutes 49 s
Maximum usage (1 day)	6 h 51 minutes 48 s
Average usage (all days)	5 h 42 minutes 24 s
Average usage (days used)	5 h 42 minutes 24 s
Minimum usage (1 day)	4 h 33 minutes 1 s
Percent of days with usage ≥ 4 hours	100.0%
Percent of days with usage < 4 hours	0.0%
Total blower time	14 h 35 minutes 45 s

The settings are as follows: Insp. P. Max: 20 / Insp. P. Min.: 15 / Exp. P. 5 / Vt: 420 mL / Fr: 13

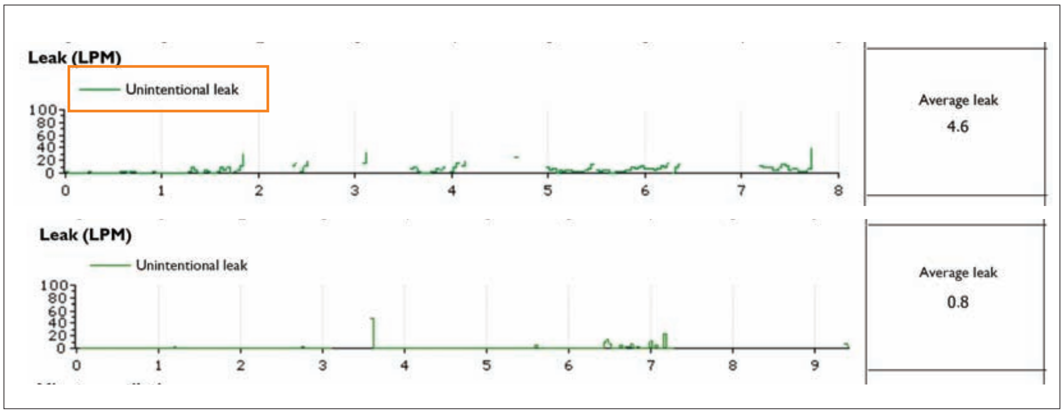


The usage profile shows us that the first night is broken up by black areas. It can be speculated that there are seal issues with the interface that affect the entire night.

If the black area was in a block at the end of the patient's night, this may have indicated that the patient took off his mask upon waking up without turning off the machine.

2. Check for leaks

a. Through daily details



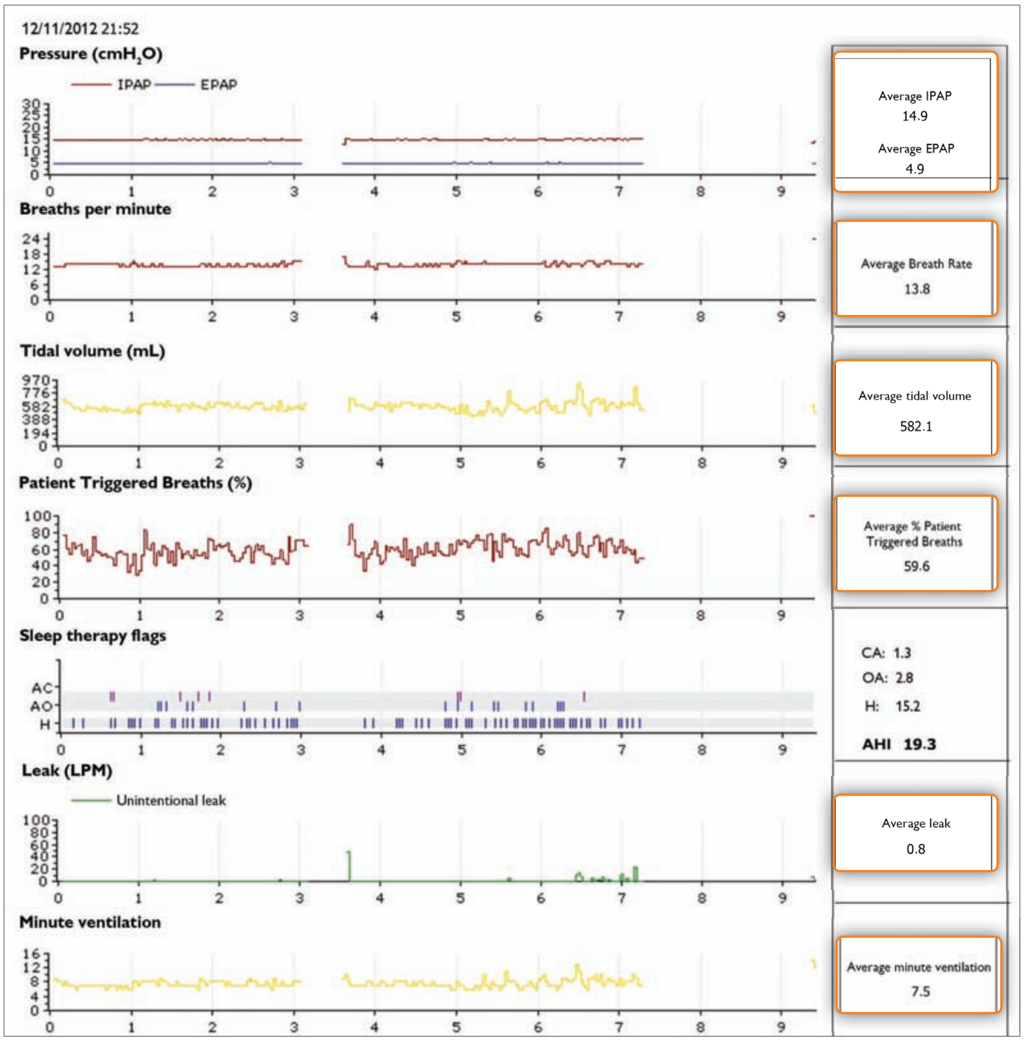
The leaks graph (unintentional leaks here) confirms what could have been guessed from the black areas seen on the patient's compliance graph.

The first night was a catastrophe in terms of leaks. Ventilation is fragmented and ineffective, interruptions in the trace are due to leaks: the machine is no longer detecting or recording. The machine is unable to compensate for these large leaks.

The seal problem seems to have been resolved, since the leaks during the second night are acceptable on the whole.

3. Check of the ventilator data

a. Through daily details



The pressure profile resembles a fixed pressures profile while the AVAPS function is activated.

The inspiratory pressure does not vary in the set range (15-20), the machine is delivering a set pressure of 15 cmH_2O.

In effect, the Vte caused by the min. Inspiratory P. of 15 cmH_2O (582.1 mL on average) is quite a bit higher than the target Vt setting (420 mL).

Therefore, the machine remains at the minimum Insp. P. for the entire night and the average tidal volume (582.1 mL) is higher than the target set (420 mL). The benefit of the AVAPS function is wasted.

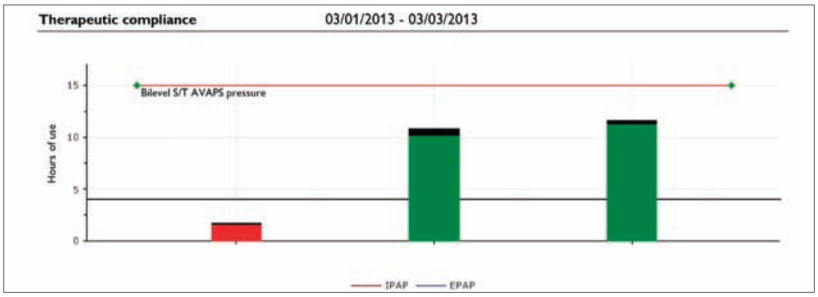
Recommendation:

The patient appears well ventilated. Based on blood gases, and feedback from the patient, we could:

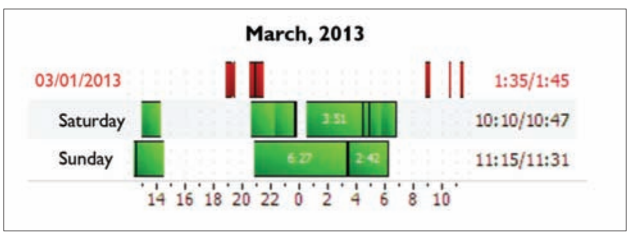
- Re-evaluate whether the target Vt of 420 mL for this patient is sufficient.
- Re-evaluate the minimum Inspiratory Pressure so that the AVAPS can function (if the target Vt is left at 420 mL then 15 as a Min. Insp. P. is too high).

Practical case 4:

1. Compliance and settings check

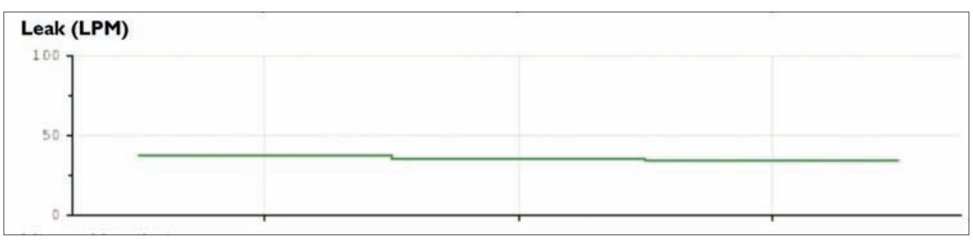


Compliance statistics	
Date range	03/01/2013 - 03/03/2013 (3 days)
Days with device usage	3 days
Days without device usage	0 days
Percent of days with device usage	100.0%
Cumulative usage	23 h 8 s
Maximum usage (1 day)	11 h 14 minutes 36 s
Average usage (all days)	7 h 40 minutes 2 s
Average usage (days used)	7 h 40 minutes 2 s
Minimum usage (1 day)	1 h 35 minutes 19 s
Percent of days with usage ≥ 4 hours	66.7%
Percent of days with usage < 4 hours	33.3%
Total blower time	1 day 3 minutes 29 s



This patient is treated with a BiPAP AVAPS in S/T mode and benefits from the AVAPS function.
The patient is starting ventilation, and a progression in compliance can be detected.

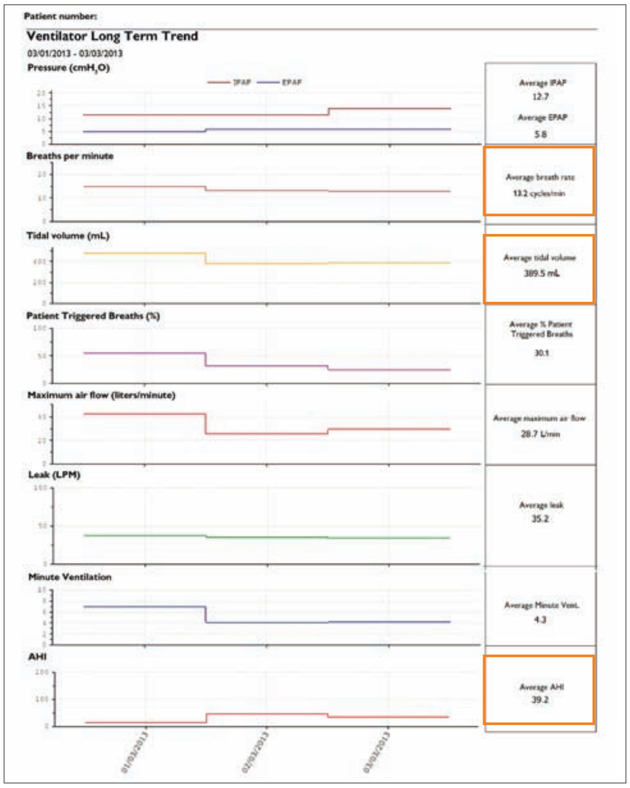
2. Check for leaks



The leaks profile is constantly decreasing. There is no problem to report.

3. Check of the ventilator data

a. Through trends



The average tidal volume does not seem high; it would be worth knowing the height of the patient.

The percentage of patient-triggered breaths is 30.1%, which means that the patient is triggering but is mostly receiving machine-triggered breaths.

The AHI is too high.

b. Through daily details



The pressure profile indicates that the maximum inspiratory pressure is reached several times.

The breathing rate profile confirms that the patient is receiving machine-triggered breaths.

The AHI shows a large number of apneas with or without obstructions.

Recommendation:

Several recommendations are possible, always in coordination with the doctor, and with one parameter changed at a time:

- Re-evaluate the target volume based on the height and theoretical weight, adjusting the pressure window and monitoring the report.
- Verify the spontaneous breathing rate at rest for the patient in order to determine his back-up rate and to monitor within the report.
- Adjust the expiratory pressure level based on the obstructive sleep apnea index.

Notes

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Document meant for professionals.
Class IIa MD: TrueBlue, ComfortGel Blue, Profile Lite, EasyLife, Amara, ComfortGel Blue Full, FitLife, OptiLife, and ComfortLite are meant as a patient interface for the application of a PCP therapy, or with bi-level pressure for non-invasive ventilation, as prescribed by a doctor. Class IIb MD: PR1 BiPAP S/T, PR1 BiPAP AVAPS, BiPAP A30, and BiPAP A40 are ventilation devices meant to provide ventilation support to treat patients suffering from respiratory impairment or respiratory failure. These MDs are subject to reimbursement by health insurance organizations in certain situations; consult the terms at the ameli.fr website. These MDs are regulated health products, and have the CE mark for this regulation, and the evaluation of their compliance was performed by TÜV. Please carefully read the user manual that accompanies each medical device for any information related to its intended use and operation.

The practical cases of this guide are presented for illustrative purposes; the recommendations of these cases do not replace good clinical judgment.

Broudy JA 1/30/14 MCI 4105828 PN 1112802